

AGRICULTURAL PUBLICATIONS.

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"Fruit Tree and Grape Vine Pruning," by Geo. Quinn (Horticultural Instructor); price, 2s. 6d.; posted, 2s. 8d.

"Vinegrowers' Manual," by A. Sutherland; price, 6d.; posted, 7d.

Journal of the Department of Agriculture, 1s. per annum in advance; 3d. per single copy to residents of South Australia. Other places, 2s. 6d. per annum.

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THE AGRICULTURAL BUREAU.—Particulars of this Organisation, of which every farmer should be a member, can be had on application to the Department.

THE JOURNAL

OF THE

Department of Agriculture

OF SOUTH AUSTRALIA.

No. 7.

FEBRUARY, 1918.

Vol. XXI.

Published Monthly by the Department of Agriculture.

Edited by H. J. FINNIS.

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R. P. BLUNDELL,

Minister of Agriculture.

POINTS FOR PRODUCERS.

Gypsum.

The Department of Chemistry has made a thorough investigation of the chemistry of the manufacture of the different commercial products obtained from gypsum, of which South Australia possesses accessible deposits of considerable magnitude. The result of this research has now been presented in Bulletin No. 7 of the Department of Chemistry, "Gypsum and Plaster of Paris," by D. C. Winterbottom, A.S.A.S.M. The author states that as the principal product made from gypsum is plaster of paris, in the course of the research a large number of experiments in the manufacture of this commodity were made, and the resulting plasters analysed and tested. A number of commercial samples of plaster were also analysed and submitted to various physical tests, and a search of the available literature was undertaken, with the object of collecting and somewhat augmenting the scattered literature at present available on the subject. The investigation also extends to hard wall plasters, and flooring plaster, which are very largely used in other countries, but at present not manufactured in South Australia

Fowls and the Fox.

The advent of the fox has had at least one good result, says the Poultry Expert (Mr. D. F. Laurie) in his annual report for the year 1916-1917. It has, in many districts, forced poultry breeders to confine the poultry for safety. This enforced yarding has benefited the egg trade, as eggs are, in such cases, gathered regularly, instead of, as formerly, on the occasion of the weekly or fortnightly visit of the hawker or other egg collector. When the poultry on a farm are running wild the owner takes about as much interest in their breeding as he does of the crows which live on his fowl's eggs. When yarded, either the farmer or his wife will look upon the poultry as domestic animals, and will take a more intelligent interest in them. Judging by the largely increasing number of letters received from farmers, this view is correct. While in many cases, the advisableness of properly housing and feeding the poultry is admitted, there are still many farmers who have not grasped that important fact. Many are of the opinion that the main function of poultry on a farm is to act as scavengers, i.e., to find their living in gathering spilled grain, weed seeds, &c., round the homestead. My answer to such is that if it suits that particular farmer let him, by all means, have a flock of scavengers, but, at the same time, let him yard his selected breeders, so that all stock shall be bred for definite purposes. This practice is adopted on many farms. You find the breeders accom-

modated in secure yards, and very often a flock of high-class layers, unmated, are housed and guarded by good yards, &c. Outside the yards one finds a flock of birds running at large.

Almonds.

In the Hackney Road Orchard, Adelaide, are six varieties of almonds, growing side by side. The trees were planted in 1908, and have all grown well. For the past five years their produce of ripe nuts has been carefully collected and separately weighed. The average yields per annum are as follows:—Peerless, 17lbs. 10ozs.; Hatch's Nonpareil, 10lbs. 10ozs.; White Nonpareil, 9lbs.; Brandis, 8lbs. 2ozs.; I.X.L., 7lbs. 15ozs.; Ne Plus Ultra, 6lbs. 15ozs.

Experimental Orchard.

In the collections of varieties at the Blackwood Experimental Orchard, says the Horticultural Instructor (Mr. Geo. Quinn), in his annual report for the year 1916-1917, nearly all the stone fruits, figs, almonds, olives, and loquats have been fruited, and an increasing number of pears, apples, and cherries came into bearing during the past season. There were now under test, besides collections of minor fruits, 520 named varieties of peach, 83 named varieties of nectarine, 125 named varieties of apricot, 401 named varieties of plum, 294 named varieties of cherry, 35 varieties of olive, 50 named varieties of almond, 44 named varieties of persimmon, 205 named varieties of fig, 18 named varieties of loquat, 1,826 named varieties of apple, 1,014 named varieties of pear, 42 named varieties of quince. It can be fully understood that in making records of their individual periods of blooming and ripening, as well as habits of growth, cropping, and comparative values of the fruits, fresh or dried, the orchardist and his staff in this matter alone had plenty to occupy attention.

Hot Feet.

The hoof of the horse contains a large percentage of water, as much as 42 per cent., in the frog. Nature protects this by a water-proof coating of horn over the hoof, which is, unfortunately, says the Veterinary Lecturer, very often removed by the farrier's rasp. The moisture is required to give the hoof its resiliency, prevent contraction, and allow for springiness when travelling over rough ground. It is lost in two ways, firstly, by evaporation from the surface, and secondly, through loss of nutrition by the blood vessels. Both ways come into play during harvest and wheatecarting, and a rational way of preventing them is to take care that the horse does not lose condition, and that he has blood enough and to spare, and that the feet are protected by a dressing consisting of half mutton fat and half Stockholm tar. This should be well brushed into the feet on Sunday morning.

Bacon Production.

Since the war commenced, the swine herds of Europe have been decreased by 32,425,000 head, according to a statement made by the Food Controller of Canada (Hon. W. Hanna) in the course of an address delivered before delegates of different swine breeding associations who recently met in Ottawa for the purpose of launching a bacon-production company. Even if the Allies were to kill the greater proportion of their pigs, he said, they could not meet their own demands. Even in the United States the production would not be much more than would meet the requirements of the home market. As long as the war lasted, the decrease in Europe must continue to develop, thus a profitable market was assured for years after the war. The delegates present, according to the *Agricultural Gazette* of Canada, gave their hearty approval to the proposal to increase production. Steps were taken with the object of enabling farmers to secure bran, shorts, and middlings, and an educational propaganda was suggested. This organized attempt to increase production bids fair to have a very stimulating effect on the pig industry of Canada.

Demonstration Cars.

Another forward step taken by the Americans in dealing with their wool industry is the institution of an educational wool car run through the Western States by the Bureau of Animal Industry, in co-operation with the agricultural colleges, says the *Pastoral Review*. The car is fitted with material to explain the relation of shrink, grade, character, etc., to the value of wool. Fleeces of each of the common grades are shown, along with live sheep carrying the same grade of fleece. The exhibit was visited by 6,000 sheep men and others interested during a tour through four States.

Agricultural Implements.

In 1911 the value of the output of the principal establishments engaged in the manufacture of agricultural implements in South Australia was £400,499. From that year on the output value fell steadily each year until 1915, when it had decreased to £258,914. The figure for the year 1916-17, however, shows a slight increase over the preceding year. According to the Government Statist (Mr. W. L. Johnston) the value of the 1916-17 output was £287,434.

Imports and Exports of Fruit, Plants, Etc.

During the month of December, 1917, 134bush. of fresh fruits, 6,852bush. of bananas, 7,609 bags of potatoes, 22 packages of plants, seeds, &c., 1,966 empty wine casks, and 110 empty cases were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 208 bags of potatoes were refused admission on account of Irish blight; 306bush. of bananas (over-ripe) were destroyed, and eight empty wine casks were fumigated. Under the Federal Commerce Act 1,873 packages of dried fruit,

92 packages of preserved fruit, and 1,643 packages of citrus fruit were exported to oversea markets. These were consigned as follows:—For New Zealand, 1,643 packages of citrus, 1,452 packages of dried, and 92 packages of preserved fruit; for India and East, 421 packages of dried fruit. Under the Federal Quarantine Act 654 packages of seed, etc., were imported from oversea markets; 82lbs. aniseed and 112lbs. of egg beet were cleaned on account of the presence of weed seeds, &c.

During the month of January, 1918, 264bush. of fresh fruits, 4,430bush. of bananas, 2,898 bags of potatoes, 27 packages of plants etc., one package of vegetables, and 2,744 empty wine casks were examined and admitted at Adelaide and Port Adelaide under the Vine, Fruit, and Vegetable Protection Acts of 1885 and 1910; 126bush. of bananas (over-ripe) were destroyed. Under the Federal Commerce Act 2,938 packages of dried and 230 packages of citrus fruit were exported to New Zealand. Under the Federal Quarantine Act 1,701 packages of seeds, &c., were imported from oversea markets; 64 packages of nutmegs were fumigated on account of weevil and 28lbs. of vegetable seeds were destroyed on account of poor germination, &c.

DEFECTS FOUND IN BUTTERS FOR LOCAL AND EXPORT TRADE.

In both local and export butters the weakest spot is that of flavor, much of the butter not possessing that sweet delicate flavor and aroma which is present in a butter made from cream produced and delivered in sound condition to the manufacturer. Too great a percentage is lacking good flavor, it being stale and unpalatable, says the Dairy Expert (Mr. P. H. Suter) in the annual report of the Department of Agriculture for the year 1916-17.

The remedy lies largely with the farmer, who can by the adoption of cleanliness, simple means to control temperatures, and early delivery do much to improve the quality. Bad flavors are almost entirely due to the changes in milk and cream before it is churned, and the farmer has control up to time of delivery. Manufacturers are equally responsible for such a great percentage of butter being produced lacking clean flavor, by reason of some not adopting a sound system of grading, whereby clean-flavored cream is often churned with inferior conditioned cream.

Streakiness in Butters.—This is a very common defect, giving a bad impression and resulting in lower values being obtained. This can easily be guarded against by a more thorough working-in of the salt.

Bad packing of the butter in export cases is evidence of carelessness. I regret to say that much of the butter submitted was very faulty in this respect, and many of the packages were found to be short of the correct weight. Air spaces in the butter also tend to hasten decomposition.

Dirty cases, mouldy paper, also were frequently noted. Factory managers would do well to be more thorough in their methods of packing for export, and to see that they present their goods in the most attractive conditions possible.

INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

VETERINARY INQUIRIES.

"G. E.," Orange Avenue, Mildura, has (1) horse with capax disease; (2) horses with bog spavin and thoropin; (3) aged gelding die after impaction of colon with partial rupture.

Reply—(1) Open well, clean out contents, paint inside with tr. iodine, dress till healed with tr. arnica (3 per cent). (2) Treatment not likely to be successful; alternate tr. arnica (10 per cent.) and oleate of mercury (20 per cent.) externally. (3) The bowel was probably weakened by parasites, and thus became paralysed, leading to the other symptoms. The treatment was correct, but nothing would have availed.

"T. H.," Scott's Creek, has young cow, off appetite, staggers, and is losing flesh.

Reply—There are several things that might cause the symptoms, one being tuberculosis, so that the case should be at once reported to the Chief Inspector of Stock, Adelaide. In the meantime keep the cow away from others, and follow advice tendered by officer of Stock Department.

"H. E. M.," Karoonda, has horses ill after eating thistle tops.

Reply—Several of the thistle family and related plants form substances which cause acute indigestion to horses, when fed in excess. Prevention is to feed bran and chaff as well. Treatment consists in stimulants and purgatives such as sweet spirit of nitre and raw linseed oil.

"J. R. B.," Wynarka, asks of what value is drake as a food for stock.

Reply—Drake (*Lolium temulentum*) is the one poisonous member of the grass family (see a former note on the subject in the *Journal of Agriculture*). Its feeding value is small, and if fed regularly, produces symptoms of intoxication followed by phrenitis and death. Its reputed value as a food is due to its stimulating the liver at first and so leading to accumulated fat which, however, is soon lost again.

"G. E.," Meadows, has Poland China sow that loses appetite and condition after farrowing.

Reply—She apparently suffers from metritis. Give her for a fortnight before farrowing 10 drops tr. pulsatilla, which she will take in a monthful of milk out of the trough. After farrowing 10 drops tr. arnica in the same way for a week. It is probably not advisable to keep her as an old brood sow.

"J. C.," Yeelanna, has two-year stallion with windy swelling size of small egg inside hock.

Reply—Probably bog spavin, common in colts, and likely to be permanent. Treatment not altogether satisfactory, but hand rub well every day and paint with tr. iodine.

"F. A.," Yallunda Flat, seeks information as to treatment for blind sheep.

Reply—Numerous replies have been given on this subject during the last few months, and a special note issued. The blindness is due to acute parasitic anaemia, and it is well to give Cooper's tablets internally as well as the following powder dusted into the eye occasionally:—Carbonate of ammonia 1, boracic acid 7 parts. Bleeding at the eye vein helps; a large percentage recover in a few weeks. See also article on "Sarcosporidiosis" in August *Journal of Agriculture*.

"E. H. E.," Yaninee, has mare, 12 years, with continued flow of milk after foal has been weaned; mare also has fleshy growth in vagina.

Reply—Probably in the first case the milk function will right itself if left alone. There is a tumor growth, probably fibroid, that will require surgical removal, and is the cause of the barrenness.

"B. S. McC.," Morehard, has mare, five years of age, partly blind from eating paddy melons last year, and two other horses with hard, persistent lumps on shoulders.

Reply—Probably nothing can be done for the blind mare, but you might try 20 drops tr. belladonna on tongue morning and evening for a month. The lumps are large glands under the skin, and must be cut out to be cured. It would be well to employ a trained veterinary surgeon to do this.

"H. S.," Willowie, reports filly, three years, staked in shoulder; will not heal.

Reply—There is probably a splinter or dead tissue that must be removed. Secure the mare, probe, cut down on obstacle, remove, then dress with spirit of iodine daily till well. If the filly is valuable it would be well to employ a trained veterinary surgeon for the work.

"P. H. D.," Morehard, has a foal that has suffered from scours since birth.

Reply—It is very probable that a pyaemic abscess on the liver is the cause of the scouring, and treatment is not likely to be successful. Try a teaspoon of formalin in a cup of milk two or three times a day.

"G. C.," Melrose, has cows three and five years, a fortnight after calving, that stagger, eyes stare, and head high and stiff.

Reply—The symptoms are those of tetanus or trismus after calving, and stomach trouble from stinkwort may be connected with them, too. A good opening drench of 1lb. Epsom salts with an ounce of sulphur and ginger in a quart of warm water to start with, then 20 drops tr. belladonna twice a day for a week should assist in recovery.

"G. F. F.," Coradale, Glencoe West, has cow, udder damaged by barbed wire; and aged mare, broken winded.

Reply—Septic mammitis has set in. Try bathing frequently with hot soap suds and rubbing in afterwards a little arnicated glycerine (arnica 1, glycerine 50). Treatment will be of no avail, the condition is chronic. Small feeds and often, and damped, never before work, always an hour's interval. A wineglass of raw linseed oil in feed each morning. A teaspoon of Fowler's solution of arsenic each evening for a month or so.

"J. D.," Craigielea, Sandalwood, has horse with swelling left side neck, difficulty in eating, drinking, and breathing; fell down kicking, blood rushed from nose, and gave relief; same symptoms two days later resulted in death.

Reply—The symptoms are those of rupture of a pharyngeal vein, which is generally associated with an abscess in the same region. Treatment would have been unsatisfactory and useless.

"J. B.," Koppio, has young pigs that stagger, heave, and hiccough.

Reply—The symptoms point to contagious pneumo enteritis, commonly known as heaves or thumps, a disease that must be reported to the Chief Inspector of Stock, Adelaide. Probably the remaining three will be dead before this reply reaches you, and if not it will be best policy to kill them, and so stamp out the disease. Young diseased pigs are never profitable to try and rear, and are often a source of danger. A treatment favorably reported on is to give a teaspoon of photographer's hypo twice a day for a few days.

"M. A. P.," Edillie, has aged gelding, suddenly lame behind, with swelling inside leg, and puss at hoof head.

Reply—The trouble was injury to hoof head, followed by lymphangitis. The treatment was all right, except the embrocation; a cooling liniment, such as vinegar and water, would have been better, and even now it will be well to give a teaspoon of saltpetre once a day in food which should be light for a week or 10 days. Light work will be advisable, and keep the foot watched, and if necessary poultice.

"H. R. L.," Laura, has cow off feed, and losing condition.

Reply—Unless there is a mechanical cause, such as wire swallowed, the symptoms point to the impaction of the rumen, and should yield to 20 drops tr. nux vomica three times a day for a week. A packet of dried yeast in a quart of milk once a day for a few days will also help.

"G. H. A. M.," Yandiah, Wirrabara, has (1) mare with injury to eye; (2) horse with bog spavin; (3) colt with paralysis.

Replies—(1) Probably the spec will gradually lessen, especially if dressed occasionally, but a small spec may be expected to be permanent. (2) Treatment for the bog spavin is not likely to be beneficial. (3) Paralysis arises from depredations of bloodworms in the vessels near the kidneys; neither the poison cart nor the stubble had anything to do with it. Treatment—A tablespoon of Fowler's solution of arsenic twice a day in a little bran, a teaspoon of sulphate of quinine once a day in a little molasses on tongue. Keep up treatment for three weeks. No charge is made for advice given by the Veterinary Lecturer.

"R. L. C. S.," Green Patch, has (a) filly, three months, very wild, galloped a good deal, lame with swelling of front fetlocks; getting worse, legs going crooked; and (b) horse with the mange.

Reply—(a) The symptoms point to rickets, and the filly will probably not be worth rearing; it is not likely to improve without treatment. If treatment is adopted it should consist of sea baths to the legs for a couple of hours daily, and tablespoon doses of syrup of phosphate of iron twice daily either licked off the spoon or fed in a little bran and crushed oats. (b) If on the sores mentioned the very much too strong application of carbolic acid has destroyed the roots of the hair, it will not grow again unless new hair-bearing skin is grafted on. For the rest of the troubled surface, wipe over lightly with coconut oil daily. As there is every probability that the mange mites have been killed the horse may be allowed out, as he will do better with paddock feed and exercise.

"H. E. R.," Rudall, has pony, seven years, with old standing injury to fetlock, with lameness and hard lump inside joint.

Reply—The most profitable treatment would be to sell, as the tendons and ligaments of the joint are becoming ossified. If treatment is attempted it would be well to dress every few days with Stockholm tar, and give a year's spell.

"J. D.," Whitwarta, has mare with tongue swollen and hard, with running sore on jaw. Mare that slipped foal at three months, with show of milk.

Reply—It would pay you to call in a trained veterinary surgeon for the mare with swollen tongue, as it should be lanced, and the nature of the injury on jaw determined. In the meantime bathe the tongue frequently with a solution of Condy's crystals, as much as will barely cover a 3d. bit to a quart. Many things will cause a mare to slip foal, such as an attack of colic or a fright, or a gallop. The show of milk often occurs. If the mare is all right no medicine is needed; if not give her 10 drops tr. aconite each morning, and the same amount tr. belladonna each evening for a week.

"J. H. W.," Hummocks Hill, has horses that ate refuse from pigs cask, worked a day or two and died.

Reply—The symptoms seem to point to laminitis, resulting from ptomaine poisoning. The one that is recovering would benefit from 1oz of photographer's hypo twice a day in drinking water for a week.

"W. H. S.," Waranda Well, *via* Streaky Bay, has colt, 18 months, with injury to hips; and pigs suffering from cough, wasting, large joints, wheezy.

Reply—It is impossible to say what is the matter with the colt without an examination, but I fear the blister will not put him right, and if it does not the cheapest way will be to destroy him. Pigs—The symptoms point to tuberculosis, and the illness should be reported without delay to the Chief Inspector of Stock, Adelaide, who will advise course to pursue.

"E. W. C., jun.," Booborowie, has pony with barbed wire cuts on hind legs.

Reply—Treatment has often occurred in these replies. Washing should be avoided as much as possible, that in conjunction with the turpentine ointment and embrocation would be responsible for the pain and swelling. Friar's balsam is good, but daily dressing with tr. iodine is better.

"G. A. H.," Tintinara, asks if any harm will happen to fat lambs fed on barley with thistles.

Reply—No harm will come to them if they are put on to it with full stomachs, but if they go on empty there is a risk they will bloat. This may be avoided by taking them off after being on an hour or so and putting them on gradually.

"C. J.," Forreston, has cow with hard udder.

Reply—The cow is suffering from mammitis. So far the treatment has been all right, but I would recommend warm glycerine to be rubbed in three times a day, and 20 drops tr. phytolacea given three times a day on the tongue.

"J. C. B. N.," Singlepine, Cowell, reports ewes dull, sluggish, tender-footed; one died with black soft lung growing to side.

Reply—Koonoona sheep do not suffer from fluke, and the symptoms described are not those of that disease, but of pneumonia, very possibly due to microscopic worms. It would pay you to give the sick sheep a course of Cooper's tablets. When sheep have fluke you will find white streaks on the liver, which is enlarged and thickened, and when you cut into the ducts a black juice comes out, and with it the flukes, which look like wet tea leaves.

"A. C.," Spalding, has mare, tucked up, scouring, and losing condition.

Reply—There is every probability that the mare is suffering from bloodworms, but as it is difficult to offer a diagnosis without seeing her, it would be advisable to call in a private veterinary surgeon. In the meanwhile give her 20 drops tr. nuxvomica morning and evening for a fortnight, and then a tablespoon of Fowler's solution of arsenic morning and evening for a fortnight.

Tantanoola Agricultural Bureau asks for a remedy for pigs suffering from rickets.

Reply—The common causes of rickets in pigs are bad breeding, breeding in, faulty feeding, deficiency of phosphate of lime, cold and wet; but as tuberculosis is also responsible, it is necessary to call in the Stock Inspector at Mount Gambier and let him investigate and advise. Remedies could be suggested for rickets, but the truly economical method of dealing with them is to destroy the pigs, as they will never pay for their keep. There is no room for sentiment in pigkeeping.

"G. J.," Brimpton Lake, has heifer that roars.

Reply—When tuberculosis or actinomyces is suspected, one should at once isolate the animal, and communicate with the Chief Inspector of Stock, Adelaide. It is very difficult for a layman to tell whether tuberculosis exists, and an affected animal may seem quite healthy. But when one roars or coughs upon being hurried, it may be suspected that the glands are enlarged, in which case they may be either felt or seen. It may be in this heifer's case that the roaring is due to teething or enlargement of the glands from some other cause, but this does not relieve you of the responsibility of reporting it to the Stock Department, as you have a suspicion of something more serious.

"A. H. T.," Cleve, has buggy mare, 12 years, slipped twin foals some time ago; now goes lame, and milk shows; this passes off; asks is it advisable to breed?

Reply—The symptoms rather point to disease of the ovaries, and if so breeding will be very uncertain and not to be recommended. It is very probable that a course of iodine of potassium (now very dear) would do her good and relieve the intermittent lameness—1 drachm twice daily for three weeks.

"R. A. K.," Melrose, has chestnut gelding, seven years, with greasy heels.

Reply—Greasy heels, being a constitutional trouble, are difficult to get rid of altogether, and always demand a good deal of grooming to keep in check. A form of treatment that meets with success is a good aloes purge, 5 drachms, according to size, and the application of white lotion to the heels daily. It is well, also, to give a course of cleansing powders.

"R. T. G.," Avondale, Cradock, reports light gelding, formerly heavyweight hurdler, lame in front, improves when warmed up, no definite symptoms, but sole of foot seems dry and hard.

Reply—It is impossible to say without an examination what is the cause of the lameness, but it may be suspected that it is in the foot, possibly a corn connected with the navicular joint, and if the horse is valuable it would be well to have a trained veterinary surgeon to examine him. If this is impracticable a light blister round the coronet might improve him.

"L. H.," Paruna, asks remedy for horse stiff in legs, especially hind, rolls eyes very much when approached. Has it been struck with sun?

Reply—The symptoms are those of tetanus or lockjaw rather than sunstroke. Keep it quiet, and let it have up to 8ozs. of Epsom salts daily in sloppy feed or drink; lessen the quantity if it improves.

"J. J. D.," Coultia, reports draught gelding, eight years, foundered.

Reply—Horses founder for many reasons; beside wheat, green feed will often do it, and from the symptoms this horse is probably foundered. It would be well to feed a good deal of bran, say 8lbs. to 10lbs. daily, and a little hay. To stand him in mud for some hours daily and give a teaspoon of Fowler's solution of arsenic three times a day for three weeks.

AGRICULTURAL INQUIRY.

[Reply supplied by Superintendent of Experiments, Mr. W. J. SPAFFORD.]

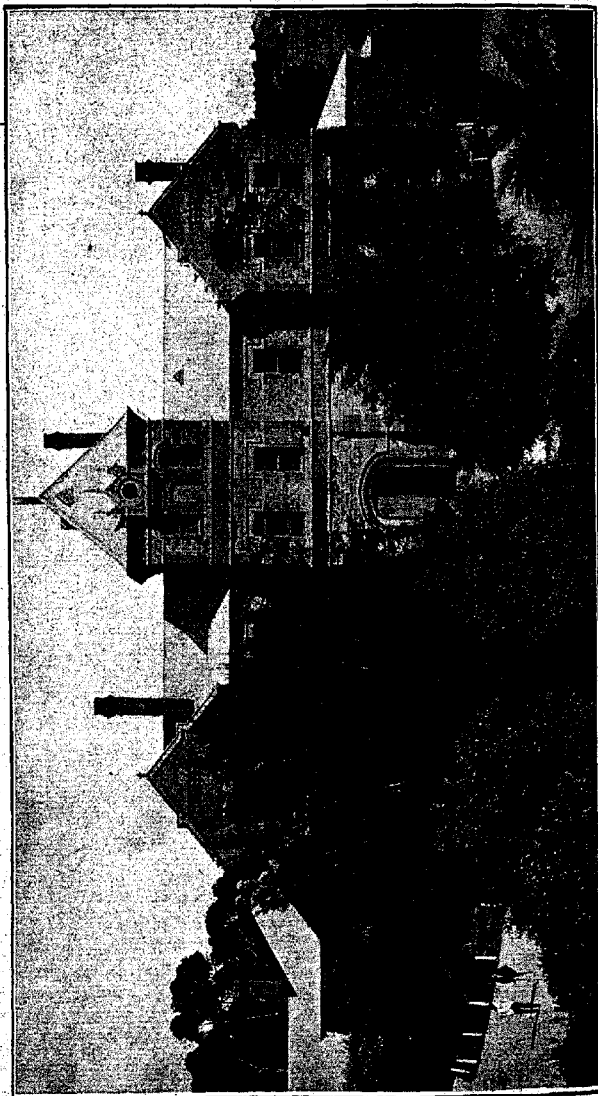
Goode Agricultural Bureau:—

(1) The varieties of olives that are giving the greatest satisfaction in the State are Boquetier and Gros Redoneau, with Salomon, Hardy's Mammoth, Verdale, Silver Verdale, Blanquette as useful varieties; any of the above are likely to suit the Far West Coast. (2) Olive groves are best started by planting out young trees that have been raised in nurseries. The young trees are either raised from truncheons (cuttings), or by grafting seedlings. Ungrafted seedlings are practically useless for planting out in groves, as in practically all cases they go back to the "wild" form, and are many years before they produce fruit, and even then the chances are that no two trees would produce the same kind of fruit. (3) Olives are eaten by pigs, and in conjunction with highly-nitrogenous foods they would do well on them, but this crop must always be considered as much too valuable a one to be thought of as a pig feed. (4) Neither the Department of Forestry nor that of Agriculture grow young olives for distribution. Messrs. E. & W. Hackett supply ungrafted seedlings at 10s. per 100, and truncheons of named varieties at 25s. per 100. (5) The most suitable time for planting in South Australia, particularly where the rainfall is not high, is about July-August for both truncheons and young trees.

ROSEWORTHY AGRICULTURAL COLLEGE.

HISTORICAL.

South Australia was the first State in the Commonwealth to establish an Agricultural College. The Colony was granted self-government in 1937, and 22 years later a definite motion for the erection of a College was moved in the House of Parliament. Subsequently this proposal found favor with the newly-appointed Professor of Agriculture (J. D. Custance, M.R.A.C., F.C.S.), who advanced the opinion that he would be able to influence the agriculture of the State more effectively through the medium of the younger generation assembled at an Agricultural College. Partly owing to his influence upon the Government, and in part also through the foresight of the administrators concerned who wisely recognised the paramount importance of agricultural education in a State that depended in the main upon rural production, the proposal to erect an Agricultural College was adopted in the year 1883. The site chosen for the institution was a block of light mallee land in the Roseworthy district, about 30 miles north of the city. At the time the land was purchased it was considered highly improbable that the scrub country lying north of Gawler would ever be brought under the plough. An eminent Scottish agriculturist, writing in 1891, described the College property as light, poor soil, resting upon a porous limestone, and inferior to the corresponding scrub land of Victoria. He regarded the inferiority of the land as a misfortune that would "continue to militate against the usefulness of the institution," and expressed regret that "in selecting a site for a college farm a better subject had not been secured." In this opinion he was by no means singular, and many able supporters of the College were very resentful that scrub land outside the boundary of the recognised cropping area should have been chosen for it. During the earlier years of the institution the criticism levelled at the Government on account of this alleged blunder appeared to be only too well founded; but as the years went by, and it became evident that the introduction of artificial manures was to have the effect of bringing into regular and profitable cultivation many thousands of acres of land, similar in character to the College holding, it came to be recognised that in many respects the site chosen was fairly well adapted for the purpose in view. It is as well to add, however, that if the intention was to locate the College in an area where it was problematical, whether farming could be economically practised or not, exception may be taken to the mode of reasoning which led to the immediate erection of a costly edifice for the housing of young men to be trained in the art and theory of agriculture under such unfavorable conditions. The fact remains, nevertheless, that by deciding to build a College at Roseworthy, whether by fortuitous accident or prophetic design, the Government of the day succeeded in bringing the agricultural scientists on the College staff in direct contact with the most pressing problems confronting the State, and it stands to the lasting credit of the College that those problems were successfully investigated



Roseworthy Agricultural College.

by the staff to the immeasurable advantage of the vast wheat-growing areas, not only in South Australia, but throughout the length and breadth of the Commonwealth.

The brunt of this pioneering work was borne by Professors Custance and Lowrie, and to their wise judgment and foresight the present position of the College in public esteem is still largely due. Their achievements established a basis upon which Professor Perkins was enabled to develop the college experimental work on an extensive scale, and also to advance the standard of agricultural education to meet the requirements of the B.Sc. degree course at the Adelaide University.

It is along these lines that the present Principal (W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S.) is developing the institution. The main functions of the college are:—

1. To educate the youths of the State in the theories underlying the various practices adapted in connection with our rural industries, and to equip them with a practical knowledge of the modern systems of management in vogue in Australia, as well as in other parts of the world.
2. To conduct experimental work bearing upon the rural industries of the State. In connection with this object it may be added that there are 250 acres at the College devoted entirely to permanent experimental work.
3. To produce and dispose of amongst the farmers of the State clean graded samples of approved seed grains. This involves the cross-breeding, selection, and purification of cereals.
4. To assist in the improvement of livestock by breeding and rearing good types for the benefit of the farming interests.

DESCRIPTION OF THE COLLEGE AND ITS EQUIPMENT.

The College is situated four miles from the Roseworthy Junction Railway Station, and seven miles from Gawler in typical South Australian mallee country. To the institution are attached about 2,000 acres of land purchased from time to time as occasion arose. A portion of this area has been allotted to College buildings and grounds; about 100 acres are under vines and fruit trees, and the balance is divided between experimental work and general farming operations that local conditions admit of.

The College buildings stand on a slight rise off the road to Wasleys, and are surrounded by vines and fruit trees. These buildings consist of the original main building illustrated in the frontispiece, two new buildings affording house accommodation for staff and students, and a new block of laboratories. The College can afford accommodation to 65 resident students, and has attached to it lecture-rooms, reading-room, well-equipped laboratories, and all that is needful to the training and comfort of those in residence.

Farm operations, although limited in their scope by climatic conditions, serve to illustrate what can, under average conditions, be successfully practised in the State. The farm is well equipped with buildings and machinery; to it are attached a good dairy herd, a large

flock of sheep, and herd of pigs that is perhaps one of the best in the State. The farm is connected with the Barossa water system, and to a limited degree irrigation operations are illustrated.

The vineyard is planted mostly with wine grapes, which are made into wine in a small model cellar. The district is not very well suited to the growing of fruit trees; nevertheless, in the College orchard are to be found the principal types of fruit trees grown in the State. Connection with the Barossa water system has rendered possible the irrigating of portion of the orchard.

CONDITIONS OF ADMISSION.

The range of the College training is adjusted to the requirements of the agricultural year; the College year opens therefore with seeding operations and closes with the vintage. Hence it is in every way preferable that new students should enter at the beginning of the College



The Students' Corridor, Roseworthy College.

year; those, however, desiring to enter at a later period will, at the discretion of the Principal, be admitted if room can be found for them on the premises.

Candidates for admission should have attained their sixteenth year at the time of entering.

Applications for admission should be made on or before the 1st of April of each year, on forms obtainable from the Secretary of the College or at the office of the Minister of Agriculture. A certificate of character from the headmaster of the school last attended by the candidate, or other satisfactory evidence of good character must be sent with the admission form.

Candidates may be required to pass an examination in English composition and arithmetic, so as to satisfy the authorities that they are in a position to benefit by the course of training imparted at the College. This examination will be held at the College on or about the

third Tuesday in April, or on such other date as may be notified to the candidate. Those in possession of certificates indicating that they have passed the compulsory standard of the State schools or its equivalent will be exempted from entrance examination.

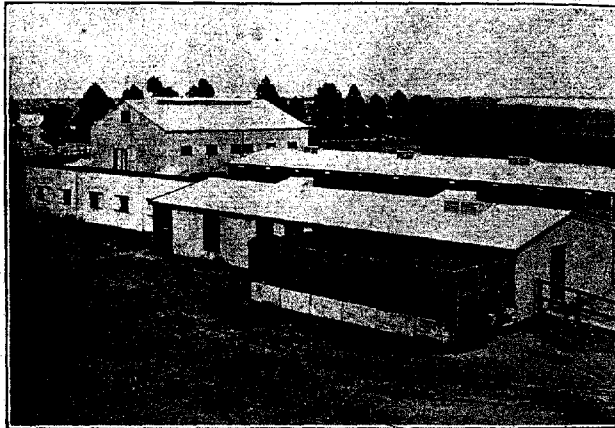
SCHOLASTIC HISTORY.

In 1885, the College opened with students; since 1906 the average number on the roll has been 50. Of the 633 students who have entered the College since its inauguration, 38.39 per cent. have gained the diploma, and many are occupying prominent positions in connection with agricultural affairs in the various States of the Commonwealth.

Amongst those who have undertaken responsible work of this character may be mentioned:—

- A. M. DAWKINS.—Vice-Chairman of the Advisory Board of Agriculture and State Wool Board.
- T. E. YELLAND.—General Secretary Farmers' Co-Operative Union.
- A. W. ROBINSON, M.P.—Breeder of Stud Border Leicester sheep.
- W. J. COLEBATCH, B.Sc., M.R.C.V.S.—Principal Roseworthy Agricultural College and member of the Advisory Board of Agriculture.
- J. W. SANDFORD.—Managing Director A. W. Sandford & Co., dairy produce merchants.
- H. E. LAFFER.—Late Viticultural Instructor and Lecturer on Horticulture, Viticulture, and Oenology at Roseworthy College. Member of Vinegrowers' Association and Phylloxera Board of South Australia. Now Viticultural Expert for New South Wales.
- C. A. GODDARD.—Inspector of Stock.
- C. P. HODGE.—Manager Soldiers' Training Farm at Mount Remarkable.
- R. H. MARTIN.—Manager Stonyfell Vineyards, Vice-President Vinegrowers' Association.
- A. E. V. RICHARDSON, M.A., B.Sc.—Superintendent of Agriculture in Victoria and member of Commonwealth Advisory Council of Science.
- W. J. SPAFFORD.—Superintendent of Experimental Agriculture in South Australia.
- E. S. ALCOCK.—Superintendent of South-Eastern Experimental Plots.
- C. G. SAVAGE.—Manager State Experimental Orchard at Berri.
- R. H. F. MACINDOE, G.M.V.C.—Assistant Government Veterinary Surgeon (on active service).
- H. C. WILSON.—Manager Werribee Experimental Farm, Victoria.
- W. C. KUENE.—Government Poultry Inspector.
- R. BAKER, Instructing in Dairying at Roseworthy College.
- F. K. WATSON, M.A., B.Sc.—Agricultural Engineer (on active service).
- L. T. COWAN, B.Sc.—Breeder of Stud Jersey cattle.
- A. T. JEFFERIS, B.Sc.—Chemist to the Queensland Department of Agriculture (on active service).

- W. R. BIRKS, B.Sc.—Agricultural Inspector, New South Wales. Winner of Farrer Scholarship (on active service).
 E. L. ORCHARD.—Farm Superintendent, Roseworthy Agricultural College.
 L. S. DAVIE.—Manager Experimental Farm at Kybybolite.
 L. J. COOK.—Manager Experimental Farm at Minnipa.
 R. C. SCOTT.—Experimentalist and Assistant Lecturer on Agriculture at Roseworthy College.
 R. H. MOWAT.—Inspector under Phylloxera Board (on active service).
 C. F. STEPHENS, B.Sc.—Ridley Scholar, 1913. Formerly Assistant Agricultural Chemist, Roseworthy College (on active service).
 F. H. DEALY.—Ridley Scholar, 1915 (on active service).



A Group of Farm Buildings, Roseworthy College.

ROSEWORTHY COLLEGE AND THE WAR.

Approximately 180 former students of Roseworthy College have joined the colors; this figure represents a very high percentage of the available eligible men on the College register, and it would have been still higher had parental wisdom not intervened between the present students and their natural desire to join the ranks. No less than 25 of our brave lads have made the supreme sacrifice, and their honored names will shortly be inscribed on the College war roll.

ENTRANCE SCHOLARSHIPS.

1. Six scholarships, each of the annual value of £30 tenable for three years, are offered for competition each year by the Government.
2. Competitors must be boys of not less than 16 nor more than 19 years of age on the 1st of April of the year in which they compete, and must not have been already in attendance at the College.

3. One scholarship will be allotted to each of the following districts:—

District No. 1.—The corporations of Adelaide, St. Peters, Norwood, Unley, Thebarton, Hindmarsh, Port Adelaide, and Semaphore.

District No. 2.—The county of Adelaide, exclusive of the corporations included in district No. 1.

District No. 3.—The counties of Grey, Robe, MacDonnell, Cardwell, Buckingham, Russell, Hindmarsh, Sturt, Carnarvon, Flinders, Jervois, Musgrave, and Robinson.

District No. 4.—The counties of Daly, Fergusson, and Stanley.

District No. 5.—The counties of Gawler, Light, Eyre, Albert, Alfred, Burra, Young, Hamley, and Kimberley.

District No. 6.—The counties of Victoria, Frome, Dalhousie, Herbert, Newcastle, Granville, Lytton, Blackford, Hanson, Derby, Taunton, the corporation of Port Augusta West, and such parts of the State as are not otherwise specified.



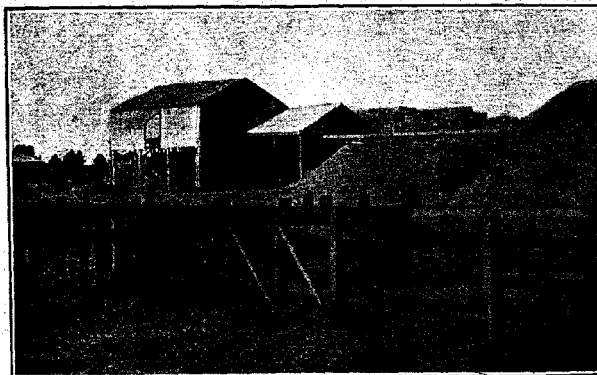
A Disc Cultivator at Work, Roseworthy College.

4. The parents or guardians of any candidate must have been resident in the State for at least two years immediately preceding January 1st in the year of competition, and the candidate must compete in that district in which is situated the school he may have last attended. If, however, any candidate has been less than two years at the school last attended the Minister shall decide in what district the candidate is to compete.

5. The subjects of the competitive examination are the following:—

(a) ENGLISH COMPOSITION.—Candidates will be required to write a short essay on a familiar subject; spelling, style, and general arrangement will be taken into consideration by the examiners.

- (b) ARITHMETIC.—Papers will embrace the work of the fifth class of the State schools.
- (c) MENSURATION.—Candidates will be examined on the principal geometric properties of regular geometric figures, together with the calculation of their areas and volumes.
- (d) ALGEBRA.—Examinations in this subject will cover the reduction of simple algebraic expressions; the solution of linear equations with one or two variables; the plotting of points and lines on squared paper; and the graphical solution of simple equations.
- (e) DRAWING.—Practical geometry as specified for the first grade examinations of the Board of Governors of the Public Library. To draw plans from figured sketches.
- (f) MANUAL OPERATIONS.—Candidates will be expected to show some familiarity with simple manual operations.



Students Threshing Wheat, Roseworthy College.

6. Intending candidates must forward their names to the Secretary of the Agricultural College not later than March the 1st of the year in which they propose competing.

7. All applications must be made on a printed form, which may be obtained from the Secretary of the College or at the office of the Department of Agriculture.

8. The application of each candidate must be accompanied by satisfactory evidence that he is eligible for competition under these regulations.

9. The scholarships are only tenable so long as the holders continue students at the Agricultural College, and conduct themselves to the satisfaction of the Principal.

10. The scholarship examinations will be held at the Agricultural College about a fortnight before the opening of the first session in each year.

The order and arrangement of the course of studies is subject to periodical revision. For the present the following is the arrangement in force:—

FIRST YEAR.	
Subject.	Lecturer.
Agriculture	R. C. Scott, R.A.C. Diploma.
Chemistry	J. H. Phillips, B.Sc.
Bookkeeping	H. C. Pritchard.
Veterinary Anatomy	F. E. Place, B.V.Sc. M.R.C.V.S.
Physics	A. J. Adams, M.A.
Botany	
Mathematics	
English	

SECOND YEAR.	
Agriculture	The Principal.
Viticulture	H. E. Laffer, R.A.C. Diploma.
Fruit Culture	
Chemistry	J. H. Phillips, B.Sc.
Surveying	J. Paull.
Dairying	R. Baker, R.A.C. Diploma.
Veterinary Science	F. E. Place, B.V.Sc., M.R.C.V.S.
Physiology	
Physics	A. J. Adams, M.A.
Wool Classing	Henshaw Jackson.

THIRD YEAR.	
Agriculture	The Principal.
Viticulture	H. E. Laffer, R.A.C. Diploma.
Fruit Culture	
Chemistry	J. H. Phillips, B.Sc.
Surveying	J. Paull.
Dairying	R. Baker, R.A.C. Diploma.
Veterinary Science	F. E. Place, B.V.Sc., M.R.C.V.S.
Aviculture	D. F. Laurie.
Wool Classing	Henshaw Jackson.
Ornology (optional)	H. E. Laffer, R.A.C. Diploma.

JOHN RIDLEY MEMORIAL SCHOLARSHIP.

This scholarship was established in 1913 for the perpetuation of the memory of the late Mr. John Ridley, whose reaping machine, constructed in the early forties, demonstrated the practicability of harvesting the ripe ears of the standing grain crops and ushered in that era of agricultural progress which has made South Australia one of the foremost wheat-producing States of the Commonwealth.

A sum of £1,000 was offered through the Advisory Board of Agriculture for the establishment of this Scholarship by donors who wished to remain anonymous, a condition of the gift being that the Government should give a like amount.

Conditions were agreed upon under which three Trustees are elected annually. One is elected by the Advisory Board of Agriculture, the second by the Faculty of Science of the University of Adelaide, and the third is the Principal of the Agricultural College, *ex officio*.

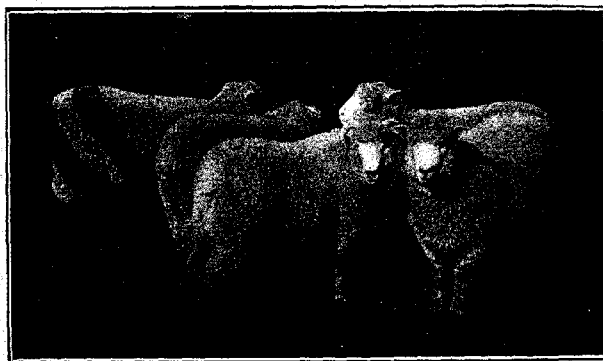
The Scholarship is tenable for two years, is awarded in alternate years, and (subject to the regulations hereunder) is open to Diploma Students who are desirous of completing their B.Sc. degree in Agriculture at the Adelaide University.

*Regulations Governing the "John Ridley Memorial"
Scholarship.*

1. The John Ridley Memorial Scholarship, tenable for two years, will be awarded in alternate years, beginning in 1913, to Diploma Students of the Roseworthy Agricultural College who are desirous of completing their B.Sc. degree in Agriculture at the Adelaide University.

2. Apart from individual cases in which insuperable objections may be shown to exist, the Scholarship shall be offered in the first place to the Gold Medallist of the year in which the Scholarship becomes available.

3. Should the Gold Medallist of the year elect not to take advantage of the Scholarship offered him, then it shall be offered successively to



Prime Export Lambs, Roseworthy College.

the students following him in order of merit, provided that, in the opinion of the Trustees, the selected candidate is fitted for University work.

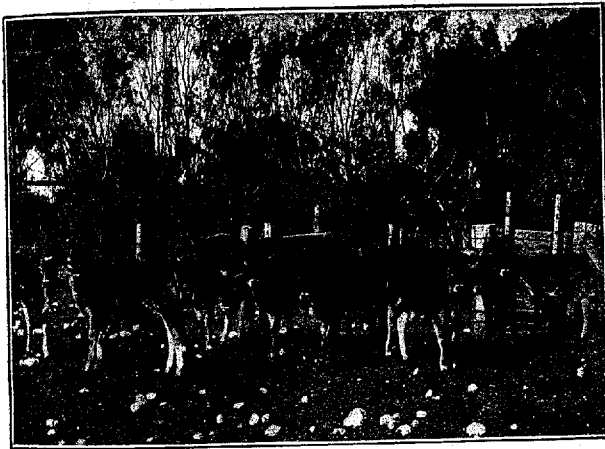
4. Should no suitable candidate be forthcoming from the Diploma Students of the year in which the Scholarship becomes available, the Trustees may either offer the Scholarship to a Diploma Student of the year immediately preceding or hold it over for the benefit of a Diploma Student of the year immediately following; or finally authorise the expenditure of the money on some educational object immediately connected with the Roseworthy Agricultural College.

5. The award of the Scholarship shall be made at a meeting of the Trustees to be convened as soon as the Roseworthy Agricultural College Diploma Examinations for the year have been finalised.

6. Should the candidate selected not have passed the usual examinations qualifying for attendance at the University, the Trustees may,

on the receipt of his written request, grant the candidate one year's grace to pass these examinations. During the course of this year the Scholarship money shall be banked for the benefit of the prospective scholar. Should, however, the candidate fail to qualify for attendance at the University in the 12 months allowed him for the purpose, his right to the Scholarship shall lapse *ipso facto*, and the Scholarship shall then be offered to Diploma Students of the year immediately following the one in which the original award was made.

7. At the end of each University term, the Trustees shall seek a report from the University authorities concerning the general progress and conduct of the scholars; in the event of lack of application or misconduct being reported, the Trustees shall, through the Secretary, draw the scholar's attention to whatever is reported to have been amiss, and warn him that unless speedy amendment is shown the Scholarship will be withdrawn.



Jersey Calves, Roseworthy College.

8. The money to be allotted yearly towards individual Scholarships shall be the yearly interest accruing from the investment of the £2,000 originally donated for this purpose. It shall, however, be lawful for the Trustees to increase this allotment in any given year, should they find themselves in possession of adequate funds for the purpose.

9. Quarterly payments shall be made regularly by the Secretary to each scholar, starting from the 15th February in each year; and the Secretary shall, for each payment, receive due quittance under the scholar's hand.

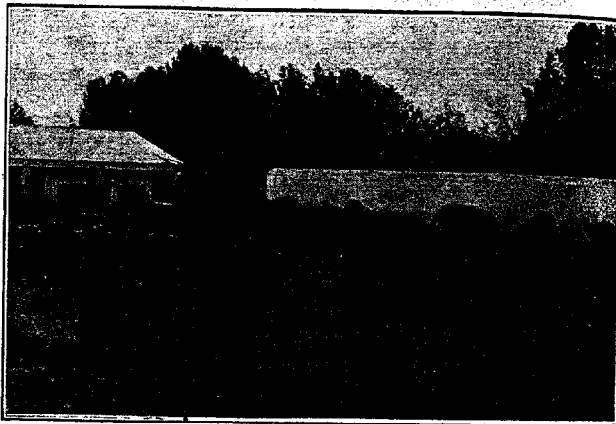
10. Should a Scholarship lapse through the decease of the holder, or should it be withdrawn under Regulation 7, it shall be lawful for the Trustees to make use of the money available on the lines foreseen in Regulations 4 and 8, or to allow it to accumulate towards the capital account.

CONDITIONS UNDER WHICH THE B.Sc. DEGREE IN AGRICULTURE
MAY BE OBTAINED.

On December 7th, 1905, the Roseworthy College was formally affiliated with the University of Adelaide. Under this affiliation regulations have been approved to enable College students to take a special course at the University for the B.Sc. degree in Agriculture after they have taken the ordinary course of training at the College.

The regulations relating to this degree are as follows:—

Students are required to attend at the College for two complete



Herd of Berkshire Sows, Roseworthy College.

years, and take the ordinary College course in the following subjects, which form part of the College Diploma:—

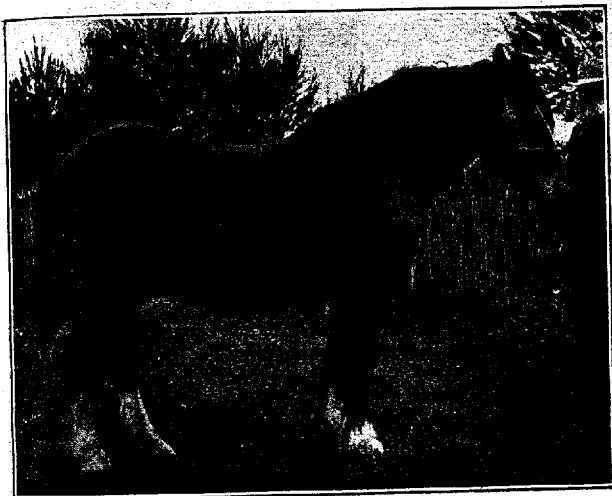
- The Principles and Practice of Agriculture.
- The Principles and Practice of Fruit Culture.
- The Principles and Practice of Dairying.
- Elementary Veterinary Science.
- Agricultural Chemistry (for one year only).
- Surveying and Levelling.
- Wool-classing.
- Principles and Practice of Viticulture.
- Principles and Practice of Wine-making.

Every candidate shall—

- (a) Be a matriculated student of the University.
- (b) Before matriculating pass the senior public examination, including in such examination the subjects of algebra and arithmetic and geometry.
- (c) Before or after matriculating, pass in two of the following languages in the senior public examination:—Latin, Greek, French, German, provided that one of the two shall be French or German.

- (d) Attend regularly courses of lectures at the University, and pass examinations in mathematics, physics, chemistry, physiology, elementary biology (relating to the morphology and physiology of the animal kingdom), and botany, within a range of study to be annually defined in the calendar of the University. These subjects are called the compulsory subjects for the degree.

Candidates who, at the higher public examination, have distinguished themselves in any of the following subjects:—Physics, inorganic chemistry, biology, botany, or mathematics (to include both algebra and trigonometry and geometry and trigonometry), shall be exempted from the University lectures, practical work, and examination in the corresponding compulsory subjects.



Clydesdale Mare, "Ruby," Roseworthy College.

Candidates who, at the higher public examination, have passed, but not distinguished themselves, in any of such subjects, may be given such exemption or standing as the University Council shall determine.

- (e) Attend lectures regularly at the University and pass examinations in chemistry, geology, and botany, as prescribed in the syllabus of the University for the B.Sc. degree in agriculture.

Candidates are also required to conduct an investigation on some agricultural subject approved by the faculty of science, and to submit a report thereon, which must be approved by the examiners appointed by the Council of the University.

FEES.

The fees are £30 per annum, payable *pro rata* at the beginning of each session. Fees do not include laundry, stationery, chemical apparatus, books, and other personal requisites. A special fee of 6s. 8d. per session is charged to all students for medical attention by visiting medical officer, who visits the College each week during session time. Medicines, &c., are supplied from the dispensary free of cost. Special rates are charged for attention by medical officer at times other than the usual visiting days. A fee of 6s. 8d. per session is charged to cover expenses in connection with the College sports.

Students must provide themselves with the books shown as "required" for each subject in the syllabus. The books "recommended" may be consulted in the College library.

ALMONDS.

The almond tree, when in average good health and growth, will begin to bear fruit about the third year after planting, and the production will increase until the maximum is reached in about the 10th or 12th year. The class of soil most suitable is a well drained loam, not too stiff, and containing a fair proportion of lime, says the Horticultural Instructor (Mr. Geo. Quinn). These trees are very susceptible to injury from excessive wet during the winter months, hence the need for effective drainage through the soil, even if the surface of the land be sloping. The trees, if planted in blocks, should be set from 22ft. to 24ft. apart, to permit the free distribution of air and light. If grown on boundaries as windbreaks, they may be set in a double row 12ft. to 15ft. apart each way.

Young almond trees budded to the various kinds most desirable can be obtained from any of the established nurserymen carrying on business in this State. The best time of the year for transplanting almond trees is in the early winter, after the ground has received a good wetting, but is still warm. This is usually from the beginning of May until the middle of June. The average price of standard softshell almonds since federation took place has been about 6d. per lb. It is difficult to quote the fair average yield for trees in full bearing, as no data could be obtained for any large area; much depends on the varieties grown.

In the Government Orchard at Hackney Road six well-known varieties planted in 1908 have been tested for their yields for the five years 1913-17, with the following average results:—Peerless, 17lbs. 10½ozs.; Hatch's Nonpareil, 10lbs. 10½ozs.; White Nonpareil, 9lb.; Brandis, 8lbs. 2½ozs.; I.X.L., 7lbs. 15ozs.; Ne Plus Ultra, 6lbs. 15ozs. These figures indicate probably the best kinds for growing under conditions similar to those existing on the Adelaide plains, and it will be noticed that the very much planted variety, Brandis, is low down on this list, and these facts are supported by the general results obtained commercially with this variety.

SOME CONSIDERATIONS ON THE ADVISABILITY OF ENDEAVORING TO ESTABLISH THE SUGAR BEET INDUSTRY IN SOUTH AUSTRALIA.

[By ARTHUR J. PERKINS, Director of Agriculture.]

I.—THE QUEENSLAND ATTITUDE.

Whilst attending in Melbourne the Commonwealth Agricultural Conference recently convened by the Hon. the Prime Minister, I endeavored to glean all possible information as to the general position of sugar in Australia. The Queensland point of view was put to the Conference very fully by Mr. H. T. Easterby, and subsequently his *ex parte* statement was controverted by Victorian representatives, and particularly by Dr. Cameron. It was generally felt, however, that the issues raised were in their incidence political rather than technical; hence, in the circumstances, and in the absence of any special mandate in this direction, the Conference did not feel justified in adopting any special resolution bearing on the sugar industries.

A. PLEA FOR MONOPOLY ON NATIONAL GROUNDS.

The chief contentions of the Queensland representatives admit, I believe, of being summarised as follows:—

1. The sugar cane industry is vitally essential to the effective economic occupation of the coastal areas of North-Eastern Australia.

2. Hence the sugar cane industry is indissolubly linked up with the question of national defence.

3. These north-eastern coastal areas (situated chiefly in Queensland, and to a less degree in New South Wales) are, from the point of view of climate and soil, quite able to meet all future Commonwealth sugar requirements.

4. If local sugar cane fields are to be manned by white labor, they cannot possibly compete, even on the Australian markets, with Java, Mauritius, or Fiji.

5. From these facts it follows—(a) that a high protective tariff is essential to the continuance of the sugar cane industry; (b) that Australians must resign themselves to relatively dear sugar; and (c) that there is no likelihood of a profitable overseas trade in sugar.

6. It does not appear that Queenslanders look upon even the present high tariff of £6 a ton with eyes of complete satisfaction.

7. The infant sugar beet industry of Victoria is looked upon as a direct menace to sugar cane growers, and an indirect one to the effective occupation of North-Eastern Australia by non-colored races.

8. Finally the somewhat injudicious suggestion was made that in the interests of national welfare, the future progress of the sugar beet industry should be curbed by a discriminating excise duty levied on beet sugar alone.

CAN QUEENSLAND'S PLEA FOR SUGAR MONOPOLY BE JUSTIFIED?

If we grant the premises that only sugar cane growers can effectively occupy tropical and sub-tropical Australia in the interest of the white races, then Queensland's claim to local sugar monopoly, albeit put forward rather over-zealously, is entitled to respectful consideration. Western and southern States alike would, I suppose, admit in these times that questions of national defence must take precedence of all others; and that in certain circumstances dear sugar may prove cheap sugar after all. Moreover, our well-considered policy of excluding colored labor from the Commonwealth has imposed upon us certain definite obligations towards our tropical and sub-tropical regions; and if, to the exclusion of all other forms of agricultural activity, the profitable exploitation of the latter is absolutely dependent upon sugar cane, then any steps leading to the gradual disintegration of a well-established industry might easily end in national disaster.

Unfortunately, I am not sufficiently versed in tropical agriculture to decide whether or not an alternative to sugar cane could not be found, should sugar beet eventually prove too formidable a rival. It is, however, impossible to overlook the fact that vast vested interests such as we have under consideration, built up slowly and at great expense, usually carry with them sufficient influence to award to themselves the label of "national," however little they may intrinsically be entitled to it. Nor can we agree to accept, blindfolded, the bare assertions of interested parties, and forego our natural rights of inquiry. There are, for instance, two questions, among others, which I should like to see answered straightforwardly.

1. Between 1904 and 1914 the area under sugar cane in New South Wales fell from 21,500 acres to 11,400 acres. In this connection, it may be asked, what more profitable means of utilizing the land has been discovered in New South Wales; and what are the reasons that would prevent its extension to Queensland should the sugar cane industry show signs of collapse?

2. When, subsequently to the Napoleonic wars, beet sugar almost drove cane sugar off the Continent of Europe, and brought ruin to the tropical sugar cane plantations, what new lines of agricultural effort were perforce eventually resorted to?

Frankly, it seems highly improbable that sugar cane growing should be the only outlet for the energies of white settlers in North-Eastern Australia.

THE COMMERCIAL VALUE OF THE SUGAR STAKES.

Nevertheless, Queensland claims that she is first in the field, and that with the assistance, presumably, of New South Wales, she is well able to meet all Commonwealth sugar requirements, present or future; and although hitherto she has succeeded in doing so on only rare occasions—in 1907, 1914, and the present season—there is no reason to question either her willingness or her ability, if the tariff wall be but firm and high enough. And in this connection, it is perhaps worth ascertaining what the sugar industry is worth to Queensland, and what it is costing Australia. I believe that, per head of population, the local consumption of sugar is one of the heaviest, if not the heaviest, in the globe. In so far as I have been able to determine it, this local consumption attained, in the pre-war decade 1904-1913, an average per head per annum of about 115lbs.; hence, with our present population, our average requirements of sugar are likely to be represented by about one-quarter of a million tons per annum. Through the courtesy of the Colonial Sugar Refinery Company and of the Victorian Department of Agriculture, I have been able to summarise below what have been the average Adelaide and Melbourne wholesale prices of No. 1A sugar since 1904.

Table I.—Showing Average Adelaide and Melbourne Wholesale Prices for 1A Sugar, 1904-1917.

	Adelaide.					Melbourne.		
	£	s.	d.			£	s.	d.
1904	21	15	0	..	..	20	10	0
1905	23	4	0	..	..	21	10	0
1906	20	15	0	..	..	20	0	0
1907	21	0	0	..	..	20	0	0
1908	21	15	0	..	..	20	15	0
1909	22	10	0	..	..	21	15	0
1910	22	16	8	..	..	22	0	0
1911	23	17	6	..	..	23	0	0
1912	24	0	0	..	..	23	0	0
1913	23	0	0	..	..	22	2	6
Pre war mean ..	22	9	4	..	..	21	9	3
1914	22	5	0	..	..	21	2	6
1915	25	17	6	..	..	25	12	6
1916	29	12	6	..	..	29	7	6
1917	29	15	6	..	..	29	7	6

From this table we may note three important points:—(a) That sugar apparently is uniformly cheaper in Melbourne than in Adelaide; (b) that ever since 1904 sugar has shown a progressive tendency to rise; (c) that, like everything else, sugar has shown magnificent progress in the matter of price during the war period.

We may note, too, that at pre-war mean prices Australia's annual sugar requirements had a total value of over five and a half million sterling, whilst at present day prices it stands at close on seven and a half millions. It will be understood, therefore, that on its bare merits a sugar monopoly is well worth fighting for; whether, on the other hand, we are paying too much for it is, of course, quite another matter. If the cost represents the price of national security, it is little enough; if, on the other hand, Queensland's contention in this direction will not bear investigation, then we shall be justified in asking whether means cannot be devised to place cheaper sugar at the disposal of consumers and our primary industries.

Take jam and fruit canning, for instance, articles of commerce which, as fruit growers, it would be much to our advantage to be able to export freely. Jam is, I understand, half sugar; and at £20 a ton the sugar in a 2lb. tin of jam would represent an outlay of 2.14d.; at £30 a ton, towards which price we appear gradually to be soaring, it would rise to 3.21d., and probably render profitable export out of the question. But not even £20 a ton is the average price of sugar in other sugar-producing countries—£11 to £12 a ton is closer to pre-war figures, representing only 1.23d. per 2lb. tin of jam. Nevertheless, we shall all agree that national defence must take precedence, even of local prosperity; we are within our rights, however, in insisting that very clear proof shall be given that cheap sugar is likely to place it in jeopardy.

COMMONWEALTH SUPPORT TO BEET SUGAR INDUSTRY ADVISABLE IN THE INTERESTS OF CONSUMERS.

For us in South Australia it is comparatively easy to adopt towards the sugar question an attitude of critical suspense; we are not as yet committed to sugar ventures; we have merely been invited to take the first plunge. In Victoria, on the other hand, the position is quite other; there, commendable enterprise and dogged perseverance have, after many years of struggle, succeeded in laying firmly the foundations of the sugar beet industry. A nascent industry, however, encroaching on solidly established vested rights, is always in danger of being overwhelmed by the assaults to which it is invariably exposed; hence it stands in need not only of sympathy, but of solid support. Personally, I am satisfied that time only is required to raise the sugar

beet industry of Victoria to the height of a great national undertaking; the speediness of its progress, however, will depend largely on the treatment meted out to it by the Commonwealth. As consumers of sugar—if we should never enter the ranks of producers—it is very distinctly to our interest that more than one source of supply should be open to us; and identical will continue to be the interests of the whole Commonwealth so long as it is found expedient to shut off, with a high tariff wall, the competition of foreign-grown sugar. From every point of view, therefore, apart from the disputed one of national defence, the Commonwealth should encourage, rather than discourage, sugar beet growing in Australia.

II.—THE VICTORIAN SUGAR BEET INDUSTRY.

Whether ultimately here in South Australia we shall venture on the final plunge, and endeavor to become sugar producers, will no doubt depend on a variety of considerations; but our practices, in such event, will necessarily be guided by Victorian experience. And it was with the intention of collecting available information on the subject that I visited Maffra on the conclusion of the recent Commonwealth Agricultural Conference. I wish at this stage to express my indebtedness to the Victorian Department of Agriculture; the assistance given me was unstinted, and there has been no item of information of which I stood in need which has not been supplied me most readily. Prior to my visit I had heard much that was unfavorable to the Maffra venture; I returned satisfied that wonderful results had been achieved, which have already made themselves felt on the countryside, and which in time are destined to transform it. Much has been made in some quarters of the fact that until last season the sugar factory itself has been run at an apparent loss. In view, however, of the difficulties that had to be overcome, I rather marvel that the turning stone should already have been reached; it is no mean achievement in the course of six seasons to have induced a sufficient number of Australian farmers to interest themselves in a crop calling for such meticulous care as sugar beet. Should we ever be similarly situated, I shall feel well satisfied if we but achieve equal results.

HISTORY OF THE MAFFRA SUGAR VENTURE.

It should be recalled that the Maffra Sugar Factory, which was started by a private syndicate in 1898, was two years later left on the hands of the Victorian Government as a bad debt, involving a sum of £62,000. Subsequently, for a period of 10 years, the factory was allowed to lie idle, whilst interest on capital value accumulated from year to year. In 1910 the factory was reopened, and has been kept

going ever since. The result of the several seasons are summarised below in Table II. from data kindly supplied me by the Victorian Department of Agriculture.

Table II.—Showing Beet Sugar Results at Maffra, 1910-17.

Season.	Area Sown. Acres.	Area Harvested. Acres.	Beet Treated. Tons.	Sugar Extracted Tons.
1910-11	694	458	5,970	435
1911-12	923	752	8,975	445
1912-13	1,168	900	6,207	548
1913-14	1,474	1,000	7,432	808
1914-15	1,098	990	8,843	965
1915-16	550	450	4,928	439
1916-17	1,685	1,320	15,159	1,948

The following observations may be submitted in connection with Table II. :—

1. The differences between areas sown and those actually harvested may appear at first sight somewhat disconcerting. It is sufficient to recollect, however, that comparatively new hands have been dealing with a crop calling for closer attention than it has been their practice to give their usual agricultural operations; hence many will fail, and have failed, either from lack of inclination or from ignorance of the issues involved. These are simple difficulties which time will remedy readily enough. Moreover, I had the pleasure of being introduced to some growers who had never experienced definite failures, although connected with beet-growing from the very earliest years.

2. Over the seven seasons concerned the average yield of sugar beet per acre did not attain quite to 9 tons. This is a low average; and probably not a profitable average, as I shall have occasion to show. But for reasons indicated above, there is absolutely no reason to anticipate that it is likely to continue the general average of the Maffra district. Gradually the best methods for handling sugar beet will be realized, and general average yields will tend more and more to approximate to the yields already secured by the most progressive growers of the district.

3. In 1910 the Victorian Government purchased large estates in the neighborhood of Maffra, subdivided and allotted them to farmers, subject to the condition that 10 acres of beet were to be raised annually on each farm. This liability was felt to be a hardship, particularly as some of the land proved unsuitable to beet-growing; hence it was cancelled in 1914, since which period those taking part in beet-growing have been doing so of their own accord.

4. Until the end of the 1913-14 campaign the Victorian Government had endeavored to keep up supplies for the factory by raising beet

under direct departmental supervision. This practice was found to be costly and unprofitable, and since 1914 private growers, in agreement with the Government, have been wholly responsible for the requisite supply of beet to the factory.

FINANCIAL ASPECT OF SUGAR BEET MANUFACTURE AT THE MAFFRA FACTORY.

Regular balance-sheets covering factory operations were not issued until 1912, since which period regular statements have been issued at the end of each campaign. In discussing the financial results secured, it is as well to bear in mind that the factory lay idle for 10 years, and that, apart from unavoidable repairs and depreciation, much of the plant had in the meanwhile become obsolete. From 1912 to 1916 the accumulated losses on operations amounted, after allowance for interest and depreciation, to £19,858 4s. 6d. over a period of three and a half years. If we take into consideration the largely experimental character of the work done in these opening years, and the fact that hitherto the factory has always been run considerably below its maximum, and therefore below its optimum capacity for financial results, if we take these facts into consideration, the loss is not very heavy. It is a sort of apprenticeship premium which Victoria has paid towards learning the sugar business. Moreover, it should not be overlooked that in this loss of £19,858 is included interest on the capitalised liabilities of 1913, which would lie between £13,000 and £14,000; hence the actual loss on working expenses will not have been much in excess of £1,800 per annum.

The 1916-17 season, however, created an entirely new and satisfactory position. After making allowance for interest and depreciation, this season's operations closed with a net profit of over £8,000. It cannot be denied, of course, that the steady rise in sugar values has contributed much to these highly satisfactory results. Nevertheless, local growers participated in these fortuitous market advantages quite as much as the factory, as the prices paid for beet show. Thus the factory paid in 1910-11, 16s. a ton of clean beet; 1911-12, 20s.; 1912-13, 20s.; 1913-14, 23s.; 1914-15, 23s.; 1915-16, 25s.; 1916-17, 27s. 6d.

The manufacture of sugar is apt to immobilise a relatively large amount of capital; hence, if we are ever to take it up in South Australia, it is every essential that we should scrutinize very closely results hitherto secured in Victoria. Clearly the highest factory net returns cannot be expected unless the factory can be kept running at its maximum capacity throughout the manufacturing period; and the latter is evidently limited by the area of land in the immediate neighborhood

of the factory capable of growing beet to advantage. The Maffra factory would appear to have a maximum working capacity of 250 tons per diem, and assuming that the manufacturing period can be made to extend over a period of 90 days, this represents a total working capacity of 22,500 tons per season. Although hitherto the production of beet at Maffra and in the immediate neighborhood has not yet attained to this total, there is every reason to believe, from what I could ascertain, that it will be reached in the near future. From our point of view, however, this point is of minor importance; all that it imports us to realise is that if we should ever erect a beet sugar factory we must see to it that the factory is surrounded by an area of good beet land sufficiently extensive to keep the factory at full working capacity from year to year.

A factory of the Maffra type, when fully equipped, should cost within the neighborhood of £100,000; and if we allow 10 per cent. towards interest and depreciation, we should have to account annually for £10,000 before any net profit could be claimed, or about 9s. per ton of beet with the factory running at maximum capacity.

The Victorian Department have been good enough to supply me with a statement of their manufacturing cost, independently of interest and depreciation, for the 1916-17 season. This statement is summarized below in Table III.

Table III.—Showing Manufacturing Cost at Maffra per Ton of Beet Handled, 1916-17.

	Shillings.
Labor and salaries	10.40
Sugar bags	2.02
Coal	6.11
Coke	0.18
Lime rock	1.00
Laboratory supplies	0.01
Engineering supplies	0.01
Sulphur	0.02
Acid	0.01
Soda	0.05
Tallow	0.17
Lubricating oils, &c.	0.09
	20.07

It is to be observed, therefore, that in 1916-17 the manufacturing cost, exclusive of interest and depreciation, was about 20s. per ton of beet handled. It should be added that this figure can be accepted with perfect safety, since in 1916-17 everything, including supplies and labor, was at a maximum. Hence, for a factory running at full capacity, out-of-pocket expenses independently of money paid for purchase of beet would be represented by interest and depreciation, £10,000; manufacturing cost, £22,500; total, £32,500.

RETURNS RELATIVELY TO BEET HANDLED.

The price payable for the beet is very naturally left to the factory: but it must be sufficiently high to induce growers to plant beet in preference to other crops. On the other hand, the price which the factory can offer is dominated by the current price of sugar; hence I do not propose discussing prices which can be paid for beet until we have examined in detail the usual factory manufacturing assets and their commercial value.

The amount of sugar extracted naturally varies with circumstances, and notably with the relative sugar contents of the beet itself, which again depends on strain, methods of treatment, soil, season, &c. At the Maffra factory hitherto from 9 tons to 10 tons of beet appear to have been required for the production of 1 ton of good white sugar. In this connection I propose adopting 10 tons as being for our purposes the safer of the two; and we may assume that our factory, running at full capacity, would yield annually 2,250 tons of good white sugar. Table I. shows that since 1904 sugar has varied in Victoria from £20 to £29 7s. 6d., and the yearly output of our factory would vary in value from £45,000 to £67,000. If for the present we overlook by-products, and deduct from these sums £32,000 for interest, depreciation, and working expenses, we shall have £12,500 to £34,500 to cover what can be paid for beet handled, together with a reasonable manufacturing profit.

If the whole of the available £12,500 were to go towards the payment of 22,500 tons of beet, it would not represent much more than 11s. a ton of beet, which sum is very unlikely to tempt growers. It would not appear, therefore, that sugar at £20 a ton is likely to prove very attractive to sugar beet growers. On the other hand, with sugar at £29 7s. 6d., as much as 25s. a ton could be paid to sugar beet growers, and still leave to the factory a substantial manufacturing profit of £4,375.

I hasten to state, however, that in these calculations no account has been taken of residues and by-products, some of which have high commercial value. Let us consider the principal of them. Over and above the good white sugar hitherto referred to, the Maffra returns show appreciable quantities of residual raw sugar and molasses. Both of these articles have at present high commercial value, which is likely to be maintained if power alcohol is ever to find effective use as a substitute for petrol. On the Maffra averages 2,250 tons of good white sugar should be accompanied by about 450 tons of residual raw sugar and about 1,150 tons of molasses.

I am informed that the present value of the unrefined residual sugar is £22 a ton, and that of the molasses £2 a ton. In the circumstances, and at ruling prices, the output of a sugar beet factory handling 22,500 tons of beet would be as follows:—

	£
2,250 tons white sugar at £29 7s. 6d.	67,000
450 tons unrefined sugar at £22	9,900
1,150 tons molasses at £2	2,300
	<hr/>
	£79,200
Less interest, depreciation and cost of manufacture . .	32,500
	<hr/>
Balance available for payment of beet and manufacturing profit	£46,700

If the growers were to be paid for beet at the rate of 27s. 6d. a ton, as was the case last season, a sum of £30,940 would be absorbed, leaving a manufacturing profit for the season of £15,760. This manufacturing profit would represent over 29 per cent. on the working capital involved, independently of the cost of plant and buildings, which has already been provided for.

On the other hand, if in normal times sugar were to recede to its local minimum, it is to be assumed that by-products would drop in sympathy, and our returns would then stand as follows:—

	£
2,250 tons white sugar at £20	45,000
450 tons unrefined sugar at £15	6,750
1,150 tons molasses at £1 7s.	1,560
	<hr/>
	£53,310
Less interest, depreciation, and cost of manufacture . .	32,500
	<hr/>
Balance available for payment of beet and manufacturing profit	£20,810

On the above returns payment of the beet at the rate of 18s. a ton would leave a manufacturing profit for the season of £560, or about 1½ per cent. on the working capital engaged. Returns at these prices would hardly be attractive to the manufacturer; whether they would prove profitable to growers will be discussed later on.

LEACHED BEET PULP.

Finally, among the important manufacturing residues is what is known as the leached beet pulp, *i.e.*, the pulp from which the bulk of the sugar has been leached out. So far as I was able to ascertain, full advantage does not as yet appear to have been taken of this important by-product at Maffra. Indeed, in the present season it has the appearance of an encumbrance rather than an asset. On such matters I am aware that I must speak with all diffidence, and as one who has no

personal experience of the subject he is discussing. Nevertheless, I am aware of what has been done in other countries in this direction, and until better informed shall assume that we are able to do likewise. It seems to me that the proper utilization of this pulp may easily represent the difference between profit and loss in years of low prices; it may even enable us to place cheaper sugar at the disposal of our manufacturers and consumers.

In the first place, we must realize that beet pulp is a type of food-stuff which can be fed with advantage to all kinds of livestock, for the production of flesh or milk, and even for the development of muscular power. In the fresh state its feeding value is such that 6 tons of beet pulp may be taken to be roughly equivalent to about 1 ton of good wheaten hay. At Maffra, as occasion arises, this pulp has hitherto been disposed of in the fresh state, or, rather, in the moist state. It is very questionable whether, either from the economic or the foodstuff viewpoint this is the best means of utilizing the pulp. I understand that, according to the abundance or scarcity of local forage, the moist pulp has realized from 1s. to 2s. 6d. a dray load. In the present season, when grass is everywhere abundantly available, it appears to have degenerated into a mere waste product, which may eventually become offensive. Disposed of on these lines residues from 22,500 tons of beet might realize from £1,000 to £1,500—a useful addition to returns, but by no means the maximum that might reasonably be expected from the pulp.

With suitable appliances and plant, it is possible to press and subsequently kiln dry this pulp to the consistency of ordinary bran. This is the practice adopted in the Grenada Vega (Spain), as I was able to observe in 1910. Subsequently the pulp is bagged like bran, and can be fed to livestock in the same way. In the dried state its nutritive value is approximately equal to that of bran, although not as rich in protein as the latter. The average price realized in Spain for dry beet pulp was £3 15s. 6d. a ton in 1910. I calculate that 22,500 tons of beet should yield from 3,000 to 3,500 tons of dried pulp, which would have a value of from £11,000 to £13,000. It is clear, of course, that all this is not net profit, since handling and drying costs must be taken into consideration. I feel sure, however, that the margin of profit available will be considerably in excess of the maximum that can be secured from wet pulp.

If now, in a factory treating 22,500 tons of beet, we assume the kiln-dried pulp to have a net value of £10,000, we may anticipate the following general results:—

1. With sugar at £20 a ton, and sugar residues at corresponding prices, the factory should be able to pay 20s. a ton for beet delivered,

and show a final net manufacturing profit of £8,300, or over 18 per cent. on the working capital.

2. In similar circumstances the factory should be able to pay 23s. a ton for beet delivered, and still show a manufacturing profit of over £4,900, or about 11 per cent. on the working capital.

I am quite aware that these are purely hypothetical cases, and that individual ones do not necessarily conform to normal averages. Nevertheless, if dried beet pulp should net no more than £5,000, or about one-half of the sum which on the results of other countries I have assumed to be within our reach, there need be no actual losses on a season's operations with beet at 23s. a ton and good white sugar at £20.

I do not wish to infer that the mere act of drying waste beet pulp is going to have the immediate effect of converting an unsatisfactory into a satisfactory balance-sheet. With us dried beet pulp would be a novel type of foodstuff, which would have to fight its way slowly on to the local markets; its intrinsic value is such, however, that I have no doubt as to its winning through in the end. For some years it would undoubtedly be necessary to accept for it prices below actual market value. Nor can we disguise from ourselves the fact that as yet the majority of Australian farmers are more or less averse to hand feeding. The trend of local economic conditions, however, would appear to suggest that this difficulty will eventually be overcome. In the meanwhile, should dried beet pulp at first fail to command a ready market, there is nothing to prevent the factory itself from converting the pulp into flesh, milk, or power on its own behoof—a practice generally adopted by the sugar factories of Northern France.

In conclusion, it cannot be denied that if both attractive prices are to be offered to growers and cheap sugar to the public, a sugar beet factory may find it difficult to make both ends meet. And although it may seem presumptuous on my part, I would suggest to the Victorian Department of Agriculture that possibly a better utilization of the waste pulp may offer a way out of the difficulty. It would not be the first occasion in which waste products have saved important manufacturing concerns from financial collapse.

SUGAR BEET GROWING AT MAFFRA.

I wish now to draw attention to the sugar beet industry from the viewpoint of the grower. In discussing this aspect of the question, it cannot be too strongly emphasized that, after all, beet-growing at Maffra dates back only to 1909; and in the circumstances we cannot expect the most approved methods of handling this novel crop to have

become standardized throughout the district. Through the courtesy of the Victorian Department of Agriculture, I was enabled to interview many Maffra growers; and as might have been anticipated, I ran against occasional divergence in views. On the whole, however, Maffra appears gradually to be making its own experience in beet-growing, and local public spiritedness seems to be such that should any other portion of the Commonwealth eventually turn its thoughts towards similar ventures, I have no doubt that Maffra experience, however painfully acquired, will be at its service. At the same time, it must be added that it is probably the present hesitancy in some details of practice that is largely responsible for relatively low average yields, and for the differences between areas sown and those hitherto harvested. The opinion appears general in this district that deep, fertile soils of moderate consistency can alone be depended upon for profitable crops of sugar beet. In the present season, the most promising crops would appear to be placed on recent alluvial beds; although I saw at least one fine crop on a well-covered gently rising slope. Local experience, therefore, in common with that of other countries, would appear to rule out the poorer types of arable land.

In the matter of the most suitable rotation for the beet crop, the district does not as yet appear to have made up its mind. Indeed, many growers appear to have raised several crops of beet year after year on the same land, a practice which I found in vogue in Spain in 1910. That this is not good practice is generally admitted at Maffra; that it is commonly adopted appears to be due to two facts—(1) the scarcity of good beet land in the district, and (2) the fact that the bulk of the crops are raised on high-price rented land. I have no doubt but that in time a rotation suitable to local conditions will gradually be evolved. In this direction there should be no special difficulties, since Maffra is a district in which mixed farming, dairying, and grazing are already successfully practised.

That the preparation of the land for sugar beet should be thorough is the opinion of all those who have successfully handled the crop in Maffra. All agree that the land should be broken early to a depth much in excess of that usually adopted by the average Australian farmer for ordinary crops. Some, however, prefer to subsoil behind an 8in. furrow, whilst others appear to prefer ploughing outright 10in. to 12in. deep. Subsequently the land is worked down to a fine, perfect seed bed, in anticipation of spring sowing. It is as well to state here that autumn sowing is, of course, out of the question, since the plants would run to seed on the first approach of warm weather.

So far as I was able to ascertain, manures have not yet been tested to any extent in the Maffra district; no doubt, in the course of time,

and probably in conjunction with rotation, this question will receive due attention at Maffra, as has already been the case in all European sugar beet fields.

Seeding usually takes place in late August and September; and in some cases later. Seed has throughout been supplied by the Victorian Government from importations from Russia and France. The Victorian Department is in the present season endeavoring to raise seed at Werribee, and in view of shipping difficulties it is to be hoped that they may succeed. With the facilities at their disposal there is no reason why they should not aim at producing strains of beet with high sugar percentage, on the lines adopted in Europe within recent times.

The rate of seeding hitherto adopted appears to be 10lbs. to the acre, which is perhaps excessive for seed of normal germination. On the whole, however, it is perhaps wise to err on the side of excess in the interests of a good final stand. Special drills are used, placing the seed in rows 18in. apart; and to these drills correspond special three-row horse hoes, which are, I believe, imported from America. The beet fields are kept clean throughout the growing months by repeated hand hoeings and horse hoeings. Most of the Maffra fields were in beautiful condition when I visited them last November. Thinning-out is a very important and costly operation. The seed sown is not in reality a "seed," but a pod from which two or three plants spring, and the superfluous plants have to be hoed out early. The contract price for this work is 30s. an acre, and expert workers are occasionally able to cover the acre in a day.

Finally, towards March the plants are lifted out of the ground with special beet lifters, topped in the field, and loaded for the factory.

Irrigation facilities are not great in the Maffra district; some crops, however, have, I believe, been irrigated with great success in summers of low rainfall.

COST OF SUGAR BEET GROWING.

It will be realized that in any locality in which a sugar factory is opened, an adequate supply of beet will depend very largely on the prices offered at the factory door. And whilst the factory is tied down by the current prices of sugar, the sugar beet grower has to take into consideration the cost of raising his crop and delivering it at the factory door. It is not easy to determine the average cost of production in any agricultural operation; and when determined upon, this mean figure does not necessarily fit in with individual cases. Nevertheless, I cannot avoid discussing the sugar beet question from this point of view.

I found that locally, allowing 20s. to 25s. an acre for rent, £10 an acre is supposed to represent roughly the cost of raising and delivering at factory door a 10-ton crop of sugar beet. This figure is confirmed by the experience of the Victorian Department of Agriculture, which is indicated below from data kindly supplied me.

Cost of Growing and Delivering a 10-Ton Crop of Sugar Beet.

	£	s.	d.
Deep ploughing	0	12	0
Sub-soiling	0	12	0
Ploughing and cultivating	0	6	6
Harrowing (five times)	0	15	0
Drilling	0	2	0
Seed (10lbs. at 1s. 6d.)	0	15	0
Horse-hoeing (three times)	0	6	0
Thinning	1	10	0
Hand-hoeing	0	10	0
Lifting	0	9	0
Topping (3s. 3d. a ton)	1	12	6
Carting (3s. a ton)	1	10	0
Rent	1	0	0
	£10	0	0

The above, although based on actual facts, is after all no more than a general estimate. I am able, however, to supply what may be more convincing, namely, the balance-sheet of a small Maffra sugar beet syndicate kindly supplied me by Messrs. McAdam and McDonald. It speaks well for the sugar beet industry at Maffra that these townfolk should be able to rent land, hire all labor, and raise 50 acres of beet showing a net profit to themselves of close on £5 an acre.

Messrs. McAdam & McDonald, Maffra.—Balance-Sheet re 50 Acres of Sugar Beet, 1916-17.

Expenditure.			Receipts.		
	£	s. d.		£	s. d.
Rent at 20s. an acre	50	0 0	606.48 tons clean beet at		
Ploughing and cultivation . .	105	5 0	27s. 6d.	833	18 3
Seeding and cultivation . .	18	0 0	Tops at 10s. per acre . . .	25	0 0
Thinning and side-hoeing . .	115	7 10			
Ploughing out	30	0 0			
Topping	115	4 9			
Carting	117	5 0			
Beet loading	3	9 9			
Freight, seed, &c.	61	17 11			
Balance (profit)	242	8 0			
	£358	18 3		£853	18 3

In the above the crop yield was about 12 tons to the acre, and the cost of production £12 6s. 8d. an acre, or a little over £1 a ton. These figures, from the point of view of normal cost of production, are unquestionably high, and would no doubt be very much lower in the hands

of experienced farmers working their own land and handling their own teams. It should be reiterated, however, that if outsiders can secure results so satisfactory, surely the future prospects of the industry are bright at Maffra so soon as land owners take it up wholeheartedly.

Finally, from information kindly supplied me by the Victorian Department of Agriculture, I am able to indicate below, in Table IV., some results secured by Maffra growers in 1915-16 and 1916-17 seasons.

Table IV.—Showing Returns from Some Maffra Growers in Seasons 1915-16 and 1916-17.

Growers.	Area. Acres.	Total Crop. Tons.	Yield per Acre. Tons.	Value of Beet. £	Value of Tops. £ s. d.	Net Profit per Acre. £ s. d.
SEASON 1915-16.—CLEAN BEET AT 25s. A TON.						
A	25	286	11.44	358	12 10 0	4 0 0
B	20	379	18.95	474	10 0 0	9 14 0
C	20	353	17.65	442	10 0 0	8 15 0
D	25	463	18.52	578	12 10 0	9 6 8
E	20	260	13.00	325	10 0 0	5 15 0
F	10	100	10.00	125	5 0 0	3 0 0
SEASON 1916-17.—CLEAN BEET AT 27s. 6d. A TON.						
G	50	576	11.52	793	25 0 0	5 12 2
H	45	627	13.93	862	22 10 0	7 13 2
I	10	197	19.70	271	5 0 0	12 14 6
J	8	187	23.38	257	4 0 0	15 18 9
K	58	773	13.33	1,062	29 0 0	7 2 11
L	23	392	17.04	539	11 10 0	10 8 7

A few words in explanation of Table IV. may be necessary. The first five columns deal with concrete facts which are self-explanatory. The sixth column purporting to show the value of "tops" calls perhaps for interpretation.

At harvest time sugar beet are topped in the field, i.e., separated from their leaves before being loaded for the factory. These leaves have high feeding value, and are locally estimated to be worth to the farmer about 10s. an acre, which figure has been adopted in Table IV. It will be noted that this is the figure realized by Messrs. McAdam and McDonald, as indicated in their balance-sheet. One grower informed me that he had netted £2 an acre from tops fed to sheep. It may be added that in a dairy district these tops are invaluable, since they fill a gap between summer and early winter feed.

The seventh column, indicating net profits realized per acre, is unavoidably no more than an estimate. I have assumed £10 an acre to represent the cost of raising and delivering a 10-ton crop, and an additional 10s. an acre for every ton in excess of 10 tons. These figures have been subtracted from the gross takings, and the difference

is assumed to represent net profit per acre. And it will probably be agreed that net profits which occasionally run in the neighborhood of £16 an acre are highly satisfactory; even £5 an acre represents the value of 25bush. of wheat after payment of all expenses.

By way of summary, the Victorian Department state that in the 1916-17 season 70 beet growers harvested 1,320 acres, yielding a total of 15,160 tons of clean beet, for which, at 27s. 6d. a ton, £20,845 was paid by the factory. These figures represent an average area of 19 acres per grower, yielding 11.48 tons per acre, and having a value of £15 15s. 8d., and showing an estimated net profit per acre of £5 12s.

PRICE TO BE PAID TO GROWER FOR BEET.

As we have had occasion to see, the establishment of a sugar factory implies the outlay of a considerable amount of capital, which cannot earn interest unless adequately supplied with sugar beet from year to year. The grower, on the other hand, is perfectly independent, and need not raise crops unless the prices offered for sugar beet are sufficiently tempting. No grower is likely to be a sugar beet grower pure and simple; he will generally combine with it dairying, stock raising, and other agricultural operations normal to the district. Hence, in order to tempt him, the net returns from sugar beet must as a rule be in excess of those obtainable from other possible agricultural operations. That this has been the case at Maffra in 1916 and 1917, data given in Table IV. very clearly show. We have to recollect, however, that present sugar prices are exceedingly high, and that in consequence the factory has been able to pay as much as 27s. 6d. a ton and still show a very substantial profit balance to its credit. Sugar cannot, however, continue indefinitely in the neighborhood of £30 a ton; nor, indeed, is it to the local interest that it should continue so. I have endeavored to show elsewhere that with sugar at £20 a ton the factory should be able to pay 23s. a ton for clean beet, and still show a reasonable manufacturing profit. It remains to be seen whether 23s. a ton will be sufficient, not only to leave a margin of profit to the grower, but to tempt him away from the attractions of other types of cropping.

Assuming evenness of endeavor, unquestionably it is very much a matter of yields; and in the circumstances, since in many cases the sugar contents of low-yielding crops will be higher than those of heavy yielding ones, it is perhaps unfortunate that a uniform rate of payment has been adopted at Maffra. In many other countries payment is made on sugar contents, which is roughly determined on the specific gravity of the juice, a practice which we in South Australia would be compelled to adopt if we ever attempted to grow sugar beet under

irrigation conditions. For the moment, however, we must assume—which is incorrect—that all beet has the same factory value.

If we adopt the figures which I have already used, a crop of sugar beet going 15 tons to the acre should, at 23s. a ton, leave to the grower a net profit of about £5 5s. an acre. It is to be assumed that a return of this nature would be exceedingly satisfactory to the grower. On the other hand, at the same price a 10-ton crop would not leave a net profit of more than £2 an acre, a return which, whilst still more or less satisfactory, cannot be described as very tempting. Hence, in my view, it is very questionable whether less than 23s. a ton could be offered to growers, particularly in the opening years of the industry, before farmers can have had time to familiarize themselves with the general advantages of this crop. Thus 20s. a ton might in the case of a 10-ton crop just leave to the farmer a net return of 10s. an acre, if he knew how to take full advantage of the tops; and £3 an acre in the case of a 15-ton crop. I am of the opinion that in a district in which sugar beet growing had been established for many years, probably even 20s. a ton would be accepted by growers; such a price, however, is not likely to tempt farmers in the early years of the establishment of the industry. Incidentally, it should be stated that at Maffra there is an inclination to look upon 25s. a ton as an irreducible minimum, below which growers would not care to grow beet. Having tasted of high prices, they do not care to anticipate less palatable ones. Nevertheless, it must be admitted that the ruling or prospective rates of sugar must always govern the price that can be paid for beet.

There is one item of expenditure in the growing of sugar beet which hitherto I have rather glossed over, but which, nevertheless, is of fundamental importance—I refer to the cost of conveying the beet from the field to the factory. For this item the estimates of the Victorian Department of Agriculture allow 3s. a ton, or 30s. an acre for a 10-ton crop. Clearly this figure does not admit of beet being grown at any great distance from the factory door. To a certain extent this difficulty has been overcome at Maffra by specially low railway rates. Unfortunately, railway carriage, however reasonable, unavoidably brings in more or less costly double handling. The maximum which the beet crop could bear in the matter of conveyance to the factory would vary with the price which was being paid for the beet. I gathered, however, that at Maffra 5s. a ton would be considered an extreme maximum. Possibly a way out of the difficulty would be to pay a fixed sum for beet loaded in the field, wherever situated, and arrange subsequently for conveyance by special contract.

It may be added that in some of the French beet districts the difficulty of conveyance from a distance has been met in the following manner:—A central factory capable of handling 200,000 tons or more of beet is connected by cast iron pipes with subsidiary establishments, as far as 15 miles apart, and to which the beet is conveyed. The sugar is leached out in these minor establishments, and the liquid pumped up to the central factory for further treatment. In this fashion cost of carting both beet and pulp is very considerably reduced.

III.—SOUTH AUSTRALIA'S SPECIAL INTEREST IN SUGAR BEET GROWING.

In the first portion of this report I endeavored to emphasize what appeared to be the special Commonwealth interests in the sugar beet question; and in this, its closing portion, I propose confining myself to the purely South Australian point of view. We are not, as yet, committed in any way to the growing of sugar; we have, however, been urged to take it up. It remains, therefore, for us to consider whether we are likely to derive any particular advantage from this industry, and whether the probabilities of success are sufficiently great to warrant the expenditure of the large sums of money which would be involved.

In the first place, as has already been stated, we are jammakers and fruitempers—on a small scale, it is true, but on a scale which readily admits of expansion to export proportions had we but the command of cheap sugar. Moreover, the general public, as consumers, would probably look upon "cheap sugar" as worth some slight sacrifices. On the other hand, it cannot be denied that it is only a very powerful lever that will ever succeed in extracting "cheap sugar" from the cane fields of North-Western Australia. We have had occasion to see that in sugar beet Victoria has been slowly forging some such lever; and other things being equal, it would seem advisable that we should look after our own interests rather than leave them to the benevolence of others. And I conclude that if we can grow sugar beet to advantage, it will be very much to our interest to do so.

THE LOCAL MARKET.

We shall have first to investigate the prospects of the local market; since in the matter of sugar it is very unlikely that we shall ever be able to extend further afield. If we adopt 1 cwt. per head of population as our probable average consumption, our yearly local sugar requirements would be represented by about 22,500 tons. And assuming that 10 tons of beet correspond to 1 ton of white sugar, the total present State requirements would be met by 10 factories of a capacity of 22,500 tons, and 22,500 acres of sugar beet with an average yield of 10 tons per acre.

And if, after trial, we find the sugar beet industry well adapted to local conditions, we may, if we wish, become practically independent of outside sources of supply. This, however, is hardly essential to the securing of cheap local sugar; the mere threat of it will, I believe, prove lever enough.

In any new agricultural venture, although the certainty of an outlet for produce raised must naturally prime all other considerations, due weight must be given to other points before it can be welcomed with any degree of enthusiasm. We shall have, therefore, to consider the particular portions of the State in which sugar beet is likely to thrive, and the technical and economic influence this crop is likely to exercise on South Australian farming.

ESSENTIAL CLIMATIC CONDITIONS.

I have already stated that, like mangolds, sugar beet is a summer-growing crop, which can be sown only in the early spring; hence, it follows that it can be placed with advantage only in those districts in which summer rains are tolerably regular, or in those in which irrigation can be practised.

Unfortunately, summer rains are absolutely regular in no portion of this State, although probably more dependable in our South-Eastern districts and some localities to the south of Adelaide. In all probability, sugar beet could be raised advantageously wherever summer potatoes can be grown successfully from year to year. I attach herewith, in Table V., a statement showing the rainfall at Maffra during the beet-growing months, namely, September to February, inclusive (1910-1916).

Table V.—*Showing Rainfall at Maffra During Beet-Growing Months, 1910-1916.*

Seasons.	1910-11.	1911-12.	1912-13.	1913-14.	1914-15.	1915-16.	1916-17.
	In.	In.	In.	In.	In.	In.	In.
September	4.02	1.98	2.25	0.50	1.41	1.88	5.48
October	2.94	0.99	1.02	2.91	0.06	3.21	1.56
November	2.48	1.50	3.13	3.11	1.54	0.64	2.31
December	2.61	2.48	1.11	0.28	4.01	0.34	1.89
January	2.86	5.27	0.08	0.57	1.16	1.14	2.09
February	0.26	1.82	0.84	0.42	nil	0.34	4.34
Total	15.17	14.04	8.43	7.79	8.18	7.55	17.67
Average yield of Beet per acre Harvested	13.03	5.29	6.90	7.42	10.45	10.95	11.48

It should be pointed out that even at Maffra the question of irrigation for beet has been raised, and that in years in which December

and January were dry, beet yields were comparatively unsatisfactory. For purposes of comparison I attach herewith, in Table VI., average rainfall, September-February, in various South-Eastern centres.

Table VI.—Showing Average Rainfall in South-East During Beet-Growing Months.

Months.	Mt. Gambier. In.	Millicent. In.	Kingston. In.	Penola. In.	Glencoe. In.
September . . .	3.14	2.75	2.28	2.74	3.27
October	2.54	2.12	1.65	2.36	2.72
November . . .	1.84	1.40	1.24	1.55	1.72
December	1.76	1.26	1.20	1.39	1.67
January	1.44	1.01	0.74	1.07	1.68
February	0.98	0.87	0.59	0.77	0.98
Totals	11.70	9.41	7.70	9.88	11.98

These figures indicated in Table VI. represent averages extending over a large number of years; in no case can it be said that the December-January rain is altogether satisfactory, and it is to be anticipated that in some years sugar beet crops are likely to suffer from the incidence of summer drought. In this direction, however, I do not anticipate that either Mount Gambier or Glencoe are likely to be worse off than Maffra, and perhaps the same may be said of both Millicent and Penola.

As for soils, we know that in the South-East relatively small areas of exceptional fertility are surrounded by land of low agricultural value. I do not wish to imply that much of this relatively poor land cannot ultimately be put to good agricultural use—indeed, it certainly can, and in the course of time, will be. But we cannot expect land of low natural fertility to carry profitable crops of sugar beet; hence, if we are to start sugar beet growing in the South-East, we shall have to look for first-class agricultural land, of moderate consistency, and as much as possible of good depth. Moreover, there must be a sufficiency of it in the immediate neighborhood of the factory to keep the latter well supplied with beet from season to season. In this connection, and making due allowance for rotation, I estimate the minimum required to be about 7,000 acres for one factory. Probably most of the South-Eastern potato lands would carry excellent crops of sugar beet could their owners be persuaded to give this crop an occasional trial. The reclaimed peat lands have also been suggested, and I can see no valid objection to them if their liability to early summer drought and tendency to drift could be overcome. If a sugar beet crop is to succeed, it must throughout the growing season be kept in a state of thorough tillage, and even if satisfactory germination could be secured, it is difficult to see how peat land of the Rendelsham type could be retained *in situ* when subject to regular summer tillage.

IRRIGATED SUGAR BEET.

Personally, I have greater faith in the success of sugar beet in South Australia as an irrigated crop than as a crop at the mercy of summer droughts. And it occurs to me that the Murray River areas, and particularly the reclaimed swamps, are admirably situated for the purpose. It is true that they are somewhat scattered, and that some difficulty may be experienced in conveying the beet from the more distantly situated fields. On the other hand, the yields will be heavier and more certain, and crops will, in consequence, be in a position to bear a heavier charge for conveyance of beet from the field to the factory.

I do not know how much irrigation is likely to add to cost of production; the figure given me at Maffra was about £2 an acre, which with us may or may not prove correct. On the other hand, under irrigation average yields are not likely to be much below 20 tons to the acre, which should compensate for much additional expenditure in the way of production. It should be added that irrigation introduces a factor which will probably compel the factory not to pay a flat rate per ton for all beet delivered, but a rate based on the actual sugar contents of the beet, very much on the lines a butter factory pays for its cream. If irrigation happens to be abused of—and there is always a tendency that way—individual beet plants will take abnormal development and show relatively low sugar percentage. This, of course, is undesirable; hence the necessity of factory control over growers and the power to adjust prices according to the factory value of beet delivered. In Spain, wherever sugar beet was grown, I found it to be universally irrigated; and there appears to be no reason why we should not succeed on similar lines.

In the second portion of this report I have already dealt with several aspects of the economic position, and I have no intention of covering the same ground a second time. I anticipate, for instance, that in South Australia the cost of growing sugar beet will ultimately be the same as in Victoria. There remain, however, a few other points to which attention must be drawn.

It will probably be agreed that any industry is of value to the State not only for the wealth which it helps to build up, but also for the sources of employment which it opens up. In this particular direction I believe that sugar beet growing would be invaluable to South Australia. There are few agricultural ventures that can offer a higher rate of employment relatively to area handled; and consequently there are few better calculated to build up sturdy centres of population. Of the £10 an acre which represents the cost of production of a 10-ton crop, I calculate that from £6 to £7 goes to labor, and proportionately more

for heavier crops. True, in the majority of cases the grower himself will supply some of the labor, but it is materially impossible that he should supply all of it, or even the bulk of it. At Maffra, where as yet the industry can hardly be said to be in full swing, it is calculated that apart from permanent hands from 150 to 160 men find employment in the sugar beet fields for seven or eight months of the year; whilst in addition for four months in the year the sugar factory employs 120 to 130 hands. These are factors which count, and make much for local and individual prosperity.

I have also collected a few data which tend to show how much the township of Maffra has already benefited from the enterprise of the Victorian Government in reopening the sugar factory in 1910. Prior to that year the township was more or less somnolent, and sales of property are said to have been exceedingly difficult. The reverse, however, is now the case, and I am informed that in spite of 50 new houses erected since 1910, it is quite impossible to rent a house in the township at the present moment. Old business premises have been renovated and new ones opened, and all are said to be doing a big turnover. The Maffra railway revenue has risen from £6,259 in 1909-10 to £15,196 in 1916-17. These are a few facts helping to show what the sugar beet industry can do for a locality in a very few years. And of Maffra, it may be said, that as yet it has but had a first instalment of the good things that are to come.

And lastly, although I am not sure that logically this aspect of the question should be dealt with under this heading, I am of the opinion that few forms of agricultural activity are better calculated than sugar beet to awaken in farmers that spirit of thoroughness which is essential to success in those closer settlement operations which are looming ahead of us. When the lesson has been driven home that success in sugar beet growing is conditional on the closest attention to every detail of cultivation, by inference it will gradually be extended to other types of crops, much to the advantage alike of State and individual.

CONCLUSIONS.

At the present time we consume annually about 22,500 tons of sugar, for which, according to ruling rates, we have paid in the past from £450,000 to £675,000; moreover a high protective tariff and a practical monopoly in the manufacture of sugar shut us out from the many advantages of cheap sugar. Are we prepared to face the initial expenditure of capital which will help to lift us out of an unenviable position?

The erection and equipment of 10 factories assumed to be essential to that end would probably cost us about £1,000,000. In addition, for interest and cost of manufacture we should have to disburse annually

about £325,000, of which sum about £112,500 would be absorbed by salaries and wages. We should also pay annually to growers about £260,000, who, in their turn, would probably pay over £100,000 in wages. In return, if we could but secure £183,000 for by-products and residues, which I think highly probable, we could afford to sell sugar at £20 a ton and still show an annual manufacturing profit of £48,000 to £50,000. Of the many other advantages incidental to the introduction of sugar beet in any country it seems unnecessary to recall what has already been said—it is sufficient to insist that they are very real.

From South Australia's point of view such is the position in a nut shell, and although at first more or less hostile to this scheme, after mature consideration I am firmly of the opinion that it is well worth our while putting the position to the test. It is, of course, true that during war time it would probably not be possible to build and equip sugar factories, since it would be exceedingly difficult to secure essential plant and machinery. Nevertheless it is worth recalling that the sugar beet industry of Europe owed its development to the Napoleonic wars, what time the British Fleet was cutting off sugar supplies from the Indies. On the other hand, in reply to the resolution moved last session by Mr. Goode, M.P., we could in the meanwhile set about testing localities likely to be suitable for sugar beet growing. And when the opportune moment arose, we should then be in a position to open out this new industry without unnecessary delay.

I must point out very respectfully, however, that bricks cannot be made without straw. Our estimates of expenditure have already been pared down to the last penny, and we could not possibly carry out this preliminary work in a satisfactory manner unless special provision is made for it on the 1917-18 Estimates. Indeed we must be in a position to anticipate Parliamentary approval in this direction since initial preparatory work should be put in hand not later than early July. As has already been stated, in Victoria the estimated cost of expenditure is £10 to £12 an acre. In our preliminary attempts we shall be working with inexperienced hands scattered over various portions of the State, and we shall have moreover to provide for very careful supervision. Hence, for work of this kind, I do not feel that I would be justified in asking less than £20 an acre; and assuming five plots about five acres in area we shall require provision for £500.

SOUTH AUSTRALIAN LIVESTOCK INDUSTRIES.

SUGGESTED MEASURES TOWARD IMPROVEMENT.

The Director of Agriculture (Professor Arthur J. Perkins), in the annual report of the Department of Agriculture for the year ended June 30th, 1917, draws attention to the position of South Australian livestock industries, and suggests measures towards improvement. He says:—

The latest official statistics show that the general position of South Australian livestock is far from satisfactory. In my last year's report I endeavored to draw attention to the importance of stimulating our local dairy and pig industries. It now appears to me urgent that, in the interests both of our agricultural industries and of the State as a whole, special steps should be taken towards helping our livestock industries generally to recover from the setback administered to them by drought and general economic conditions. We all feel that as a State our particular share in the creation of wealth, which is to liquidate war liabilities, is represented by "production," and both in present and prospective market conditions there is no more potent factor towards this end than livestock.

I indicate below in Table I. the position of our livestock in the decade ending in 1915, which represents the latest available statistics.

TABLE I.—*Showing Decennial Return of Livestock in South Australia, 1906-15.*

	Horses.	Cattle.	Sheep.	Pigs.
1906	206,633	325,724	6,624,941	111,240
1907	208,639	334,671	6,829,637	90,741
1908	213,385	340,376	6,898,461	78,454
1909	230,405	344,034	6,432,038	80,410
1910	249,326	384,862	6,267,477	96,386
1911	259,719	393,566	6,171,907	93,130
1912	276,539	383,418	5,481,489	69,832
1913	283,641	352,905	5,073,057	64,119
1914	267,877	300,579	4,208,461	69,893
1915	253,333	226,565	3,674,547	66,237

Table I. shows that for several years there have been appreciable decreases in every line of livestock, and in most cases these decreases have been such as to undermine very seriously important sources of State revenues. Unquestionably this unfortunate position may be partially attributed to the prolonged action of drought between 1912 and 1915. I shall have occasion to show, however, that other influences have been at work which must not be overlooked.

HORSES.

Horses, we can see, progressed with great regularity between 1906 and 1913, increasing in numbers during this period to the extent of over 37 per cent. Since 1913, on the other hand, numbers have steadily declined. In this case we must attribute the losses to the action of drought, during the course of which many horses were

sacrificed; to a check in general farming operations as a result of a condition of war; and probably, too, to the export of horses for military purposes. In any event the decline in numbers is not as yet very serious, being represented by 30,308 head, or 10 to 11 per cent. below the 1913 maximum. I am of the opinion that numbers will, in the case of horses, rise rapidly as disbanded soldiers begin to be settled on the land in large numbers.

CATTLE.

The cattle position is far more serious. Here we had regular and consistent improvement until 1911, to the extent of close on 21 per cent. From that year, however, the falling off in numbers has been equally rapid and regular, totalling 167,000 head by 1915, or over 42 per cent. below the 1911 maximum. This disturbing loss in numbers has been brought about chiefly by drought conditions, and by undue slaughtering of animals under pressure of high meat prices which have recently obtained.

It is easy to show that concurrently local dairy production has been seriously affected, and data bearing on the subject are summarised in Table II.

TABLE II.—*Showing Decennial Butter and Cheese Production in South Australia, 1906-15.*

Year.	Butter. lbs.	Cheese. lbs.
1906	8,873,632	1,398,785
1907	8,519,340	1,385,790
1908	8,130,560	1,556,894
1909	8,482,168	1,578,378
1910	10,717,486	1,796,281
1911	9,694,666	1,526,930
1912	8,394,557	1,958,027
1913	8,036,274	2,216,985
1914	6,252,961	2,000,547
1915	6,317,613	1,412,692

It will be noted that butter production, which reached a maximum in 1910 has since then declined very appreciably. This decrease in butter produced is represented by 4,399,873lbs., or over 41 per cent.; and we are now apparently producing less butter than at any other time in the 1906-15 decade.

Cheese production, which reached a maximum in 1913, fell away very rapidly during the drought to totals not much in excess of those ruling in the opening years of the decade. The maximum decline was represented by 804,293lbs., or over 36 per cent.

From these two sources alone—butter and cheese—it is possible to form some idea of the losses to our general agricultural revenues resulting from the depletion of local herds. If we take differences between maxima in each case, namely, 4,399,873lbs. of butter at 1s. a pound and 804,293lbs. of cheese at 6d. a pound, the total reduction in our agricultural resources would be represented by about £240,000 a year. This is equivalent to a reduction of about 25 per cent. on average State dairy production of about one million sterling.

SHEEP.

The decline in sheep, on the other hand, dates back much earlier than the drought years. Sheep, with numbers at 6,898,451, were at their maximum in 1908. Higher totals had, however, been registered in earlier days as 7,646,239 in 1891 and 7,004,642 in 1890. Nevertheless, since the decline in the numbers of sheep is very largely connected with the cutting up of pastoral property into farms, the 1908 total was very creditable if we take into consideration the large area of land brought under the plough between 1891 and 1908. Thus in 1891 there were only 2,533,291 acres under cultivation, whilst in 1908, or 17 years later, this total had arisen to 3,442,295 acres, implying that probably during this period an area of well over a million acres of good land had been withdrawn from pastoral occupation. And yet in these two years the total number of sheep differs by less than 800,000 head.

Land settlement has, on the other hand, proceeded with more rapid strides within recent years. In 1915 the area under cultivation had arisen to 5,347,089 acres, an increase of nearly 2,000,000 acres in a period of seven years. In this connection, however, we cannot overlook the fact that recent expansion of our cultivated area has been at the expense of mallee scrub, in which few or no sheep were kept. In spite of this, however, the decline in the number of our sheep since 1908 has been very marked, attaining to 3,223,904 in 1915, or 47 per cent. below the 1908 level.

Wool figures are equally eloquent as to the position. Our estimated total wool production was about 67,685,000lbs. in 1908, as against 33,970,000lbs. in 1915. These figures indicate a falling away of 33,715,000lbs., or just about 50 per cent.; and at present figures an annual loss of one and a quarter million sterling to the State revenues.

No doubt drought had much to do with our losses of sheep in 1914; a more potent factor, however, has been the subdivision of pastoral estates, and the fact that farmers have not yet been able adequately to combine sheep with the growing of crops. That eventually they will do so, nay, in many cases must do so, I have not the slightest doubt. Unfortunately it takes both time and money to stock up a farm, and new settlers are generally insufficiently supplied with funds to be able at one and the same time both to build up a new farm and fill it with livestock.

PIGS.

In the matter of pigs, the figures of the last decade are equally unsatisfactory, although of less material consequence, since given favorable economic conditions, the country could soon be restocked with these animals. Moreover, as I had occasion to point out in my last year's report, local pig production, unless kept slightly below local requirements, is apt, in the absence of an export trade, to involve the pig grower in ruin. Until the State can see its way actively to foster and stimulate an export trade in cured pork, there is little chance of any appreciable expansion of our pig industries; and it would be wronging farmers to encourage them in any other belief.

SUGGESTED MEASURES TOWARDS IMPROVING THE LIVESTOCK POSITION.

It will generally be agreed that South Australia, as a State, is too dependent for its prosperity on livestock industries to remain unconcerned at their decline. It would seem important, therefore, that where possible State action should be taken towards retrieving the position; and it is with this object in view that I have summarised the following suggestions.

Horses.

There is no reason to believe that an extension of normal farming operations, which may be expected at any time, will not lead to an early improvement in the number of our horses. As to quality, on the other hand, there is not the slightest doubt that within recent years very general all round improvement has been effected among the draughts. To the action of energetic private enterprise this improvement is chiefly due; aided and supported, however, by the official veterinary inspection of stallions. In the matter of horses, therefore, it does not seem necessary that State action should go beyond aiding towards the elimination of undesirable breeding animals; and in this direction official regulations and measures cannot be too stringent.

Cattle.

In dairying we have not yet, as a State, made the progress that we should have, partly because of the general innate distaste for the work among our people, and partly because of our lack of large and continuous fertile grazing areas suitable for dairy stock. The first obstacle can, in my view, be overcome by dispelling the illusion that dairying implies endless uninteresting drudgery; and in this connection the encouragement of herd-testing and up-to-date dairy methods should do much. If, for this purpose, as was suggested by the Dairy Expert and myself, the State were to offer definite sums of money to all dairy herds of 12 or more cows, which under official tests could show a high 12-month record of butter fat, not only would the dairy herds of the State be improved as revenue producers, but additionally a special interest would be created in the industry which would gradually attract to it many who now hold aloof. Special prizes, too, should be offered at the agricultural shows, not only for individual performances, but for tested herds as well. Where at all possible co-operative action in work should be encouraged; in dairy settlements, where dairymen occupy contiguous moderate-sized blocks, why should there not be co-operative milking sheds provided with milking machines, which could be supervised by neighbors over alternating periods of time?

Nor can it be said that the absence of fertile natural pastures is fatal to a profitable dairying industry. No doubt grazing pure and simple, if at all adequate, would represent the simplest and least exacting way of handling a herd, but it is by no means the only way economically open to us. Both butter and cheese can be produced to great advantage, even in the absence of good natural grazing, if judicious hand-feeding practices be but followed; and towards this end there are few farms on which forage crops, hay, ensilage, grain, &c., cannot be produced in adequate abundance.

Wherever other forms of livestock, such as sheep, are being kept in adequate numbers, it would be idle to advocate their supersession by dairy cattle. There are portions of the State, however, in which wheat-growing is more or less doomed, and over which dairy cattle are likely to prove far more profitable than any other type of livestock. This is unquestionably the case over the greater portion of the South-East, in which the foundations of a great dairying industry should have been laid years ago. Settlers in these districts who are not in a financial position to take up dairying should, in my opinion, be helped thereto. The main difficulty to be overcome is, as a rule, the storing up of adequate winter food reserves; this can, as a rule, be met by accumulating summer-grown reserves of hay, ensilage, and at times even of roots, such as mangolds. For the purpose assistance towards the erection of silos would be essential, where possible, too, towards the equipment of small irrigation plants. Nor in view of wet, bleak winter conditions should shelter-sheds for night use be overlooked. Finally, the erection of local butter factories should be encouraged in all important centres, so as to obviate the objection of unduly long journeys for the cream.

Our wet, cold districts are not, however, the only ones in which dairying can be profitably practised. Many of our northern districts, for example, have already found that cows are, in certain seasons, more reliable even than wheat. In districts of this kind summer feeding is the usual difficulty; it can, however, frequently be met by occasional summer crops; more advantageously and surely, however, by ensilage grown in winter and spring months.

The State, in its own interests, cannot do too much for the dairy industry; and if a policy of this kind be adopted, one of the first essentials is the strengthening of the departmental staff, to the end that instruction in methods may be given both to those who are beginners and those who are habitual sinners against good practice.

Sheep.

However much pastoral properties within the good rainfall areas are subdivided into farms, there is only one reason that can be accepted as sufficient for any permanent decrease in the total number of our sheep, and that is their profitable replacement by a corresponding number of dairy cattle. I am, of course, aware that since writing this report the 1916-17 livestock statistics have been published, and would appear to indicate an extraordinary recovery in sheep. These figures, it appears to me, should be accepted with caution; it seems probable that they point to an apparent rather than to an actual increase. Statistics taken at the end of December would miss the bulk of the lambs slaughtered between August and December, whereas statistics taken to the end of June would include the greater part of them. Hence, it appears to me that much of the increase we at present notice is more artificial than real. Whatever it may be, however, it does not invalidate my plea that farmers, for whom pastoral estates have been cut up, should look upon it as their duty to the State, as it is to their own interests, to help build up again the flocks that have slowly disappeared.

Dairying is profitable, but so are sheep; and the latter are frequently more congenial to the Australian temperament. There is, however, one point which needs to be driven home, and that is, that it does not pay to starve sheep any more than any other type of stock. Home grazing, in the case of the farmer's flock, should always be supplemented by a certain degree of hand feeding, for which ample provision should always be made.

I suggest that where farmers are desirous of securing sheep, but are unable to do so for financial reasons, it would be of public advantage if the State could help them towards it by making to them necessary advances under suitable guarantees.

Pigs.

Pigs can be handled to advantage on any farm, providing a market be available to absorb them when of marketable ages. And I must repeat that until this market has been opened up by the State this useful source of revenue must continue more or less closed to the farmer and the State.

AGRICULTURAL EXPERIMENTS.—REPORT FOR YEARS 1917-1918.

By W. J. SPAFFORD, Superintendent of Experimental Work.

EXPERIMENTS AT HAMMOND.

[Conducted by Mr. T. Griffin.]

Since 1908 Mr. Griffin has conducted wheat-growing experiments at Hammond in conjunction with the Department of Agriculture. These experiments consisted of two series, one dealing with the cultivation of bare fallow and the other the testing of varieties of wheats.

The cultivation plots for the period 1908-1915 inclusive had as their object the testing of the subpacker on the so-called dry farming methods, and for that eight-year periods the results showed—(1) That when subpacking is

done just before seeding it gives, at Hammond, no increase over land not subpacked. (2) That subpacking the soil at Hammond immediately after ploughing is worth a bushel extra yield over and above that obtained from land not subpacked. (*Journal of Agriculture*, November, 1916.)

As the above-mentioned increase of 1bush. per acre was too costly to produce, the arrangement and treatment of these cultivation plots was altered in 1916, and the scheme then adopted has been continued for the year under review.

CULTIVATION PLOTS AT HAMMOND, 1917.

The objects of the cultivation plots, as now arranged at Hammond, are as follows :—

- (1) Comparing the effects of rolling and subpacking on 6in. ploughing.
- (2) Comparing the effects of rolling and subpacking on 3in. ploughing.
- (3) Testing land cultivated (not ploughed) at ploughing time, and subsequently worked in the same way as ordinary fallow.
- (4) Testing the effect of cultivating land in the early autumn and then ploughing it in May.

To date, these soil treatments have given the yields set out below :—

Yields from Cultivation Plots.—Hammond, 1916-1917.

Plot.	Soil Treatment.	1916.	1917.	Means 1916-1917.
		Bush. lbs.	Bush. lbs.	Bush. lbs.
1	Ploughed 6in. deep and rolled the same day as ploughed; harrowed within a day or so; cultivated or harrowed whenever crust or weeds render necessary	19 49	12 50	16 19
2	Ploughed 6in. deep and subpacked the same day as ploughed; cultivated or harrowed whenever crust or weeds render necessary	20 43	11 54	16 18
3	Ploughed 3in. deep and rolled the same day as ploughed; harrowed within a day or so; cultivated or harrowed whenever crust or weeds render necessary	18 39	12 56	15 47
4	Ploughed 3in. deep and subpacked the same day as ploughed; cultivated or harrowed whenever crust or weeds render necessary	18 4	11 43	14 53
5	Cultivated (not ploughed) at ploughing time; cultivated or harrowed whenever crust or weeds render necessary	17 14	10 44	13 59
6	Cultivated early autumn, ploughed 4in. deep in May; cultivated or harrowed whenever crust or weeds render necessary	—	13 0	—
	Rainfall.....	13.42in.	19.47in.	16.44in.

All plots were drilled in during each season with 1bush. Bearded Gluyas wheat and 80lbs. superphosphate to the acre.

For this season the above plots suffered to a rather great extent by the ravages of mice at seeding time, and considering the comparatively few grains left to germinate and the thinness of the resulting crops, the yields obtained are very fair.

WHEAT VARIETY TESTS AT HAMMOND.

A number of varieties of wheats have been tested each year since 1908 by Mr. Griffin on ordinary fallow land, with a dressing of 80lbs. superphosphate to the acre. The following table shows how some of these varieties have behaved during the last three years, together with the average for Federation wheat over the whole period, 1908-1917:—

Yields of some Varieties of Wheats at Hammond since 1908.

Variety.	1915.	1916.	1917.	Means 1915-1917.	Means 1916-1917.
	Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.
Yandilla King	8 25	23 20	9 54	13 53	16 37
Federation	5 23	19 56	9 44	11 41	14 50
Gluyas	8 40	16 9	7 34	10 48	11 51
Red Russian	9 37	17 58	3 58	10 31	10 58
King's Early	4 27	14 13	9 46	9 29	11 59
Queen Fan	—	18 45	10 8	—	14 26
Bearded Gluyas	—	16 58	10 47	—	13 52
Federation (mean 1908-17)...	9bush. 18lbs.				

All varieties were sown on fallowed land with 1bush. seed and 80lbs. superphosphate to the acre, but the lot of them were very considerably thinned by mice, particularly the Red Russian.

EXPERIMENTS AT BUTLER.

[Conducted by Mr. C. F. Jericho.]

In 1916 wheat-growing experiments were commenced at Butler, having as their objects (1) the discovery of the most profitable dressing of superphosphate to apply to wheat in this particular district, and (2) the testing of various varieties of wheats on bare fallow.

MANURIAL PLOTS AT BUTLER, 1917.

The manurial plots commenced in 1916 were continued in 1917, and now, by arrangement with Mr. Jericho, they are put on a more or less permanent basis, the plots being properly pegged out so that each year that the blocks are sown with wheat the various plots will get exactly the same amount of superphosphate that they received in previous years. Such treatment does away

with any chance of the plots receiving any benefits from residual fertilisers that they are not entitled to; and the more often the plots are cropped the better will they show the effects of different dressings of manure.

Below will be found the yields of grain received from the wheat grown in these manurial plots for the past two years, together with the means for the period :—

Yields from Manurial Plots—Butler, 1916-1917.

Plot.	Manure per Acre.	1916.	1917.	Means 1916-1917.
		Bush. lbs.	Bush. lbs.	Bush. lbs.
1	No manure	12 12	13 30	12 51
2	$\frac{1}{2}$ wt. superphosphate	16 17	20 36	18 26
3	1wt. superphosphate	16 32	23 23	19 57
4	2wts. superphosphate	23 32	27 48	25 40
5	3wts. superphosphate	28 31	29 46	29 8
	Rainfall	15-60in.	20-58in.	18-09in.

Gluyas wheat, 1916; Queen Fan, 1917.

The returns secured this year show, even to a more marked extent than those of last year, the benefits to be derived from using comparatively heavy dressings of superphosphate in the Butler district, at all events in the good seasons. The yield of the no-manure plot—13bush. 30lbs.—although much lower even than the plot receiving only $\frac{1}{2}$ wt. superphosphate, was brought about to some extent by the peculiar season, for on November 21st 75 points of rain fell, which considerably helped it, whereas the manured plots were too far advanced towards maturity to get any benefit from this fall. If we take the local dressing of superphosphate to be represented by $\frac{1}{2}$ wt. per acre, and 5s. per hundredweight be allowed for the manure, and 3s. 3d. per bushel for wheat on the farm, the results in the following tables show very clearly that increasing the dressing of manure is but a business proposition :—

Increased Yields and Net Increased Value of Grain from the use of Superphosphate.—Butler, 1916-1917.

Manuring per Acre.	Yields 1916-1917.	Increased Yields over No Manure.	Net Value of Increase per Acre.
	Bush. lbs.	Bush. lbs.	£ s. d.
No manure	12 51	—	—
$\frac{1}{2}$ wt. superphosphate	18 26	5 35	0 15 7 $\frac{1}{2}$
1wt. superphosphate	19 57	7 6	0 18 1
2wts. superphosphate	25 40	12 49	1 11 7 $\frac{1}{2}$
3wts. superphosphate	29 8	16 17	1 17 11

Increased Yields and Net Increased Value of Grain from the use of Heavier Dressings of Superphosphate than $\frac{1}{2}$ cwt. per Acre.—Butler, 1916-1917.

Manuring per Acre.	Yields 1916-1917.	Increased Yields over $\frac{1}{2}$ cwt.	Net Value of Increase per Acre.
	Bush. lbs.	Bush. lbs.	£. s. d.
$\frac{1}{2}$ cwt. superphosphate	18 26	—	—
1 cwt. superphosphate	19 57	1 31	0 2 5
2 cwt. superphosphate	25 40	7 14	0 16 0
3 cwt. superphosphate	29 8	10 42	1 2 3 $\frac{1}{2}$

In all districts in South Australia where the question of increasing the dressing of superphosphate for wheat-growing is raised, there is an outcry that the crop will not stand it, and that they will all "blight off." Yields like the above do not look as though there was much "blighting" of the crops; and to further test it, Mr. E. A. Bristow, our fields inspector, who attended to the harvesting of these plots, took samples of the grain received from the 3 cwt. plot and from the no-manure plot to the Tumby Bay flourmill and had them weighed. The heavily manured plot produced grain weighing 65 lbs. to the bushel, and the no-manure plot wheat weighed slightly under it. This high weight per bushel is a sure indication that there was no "blighting" of the crop, because the part of the crop that is most affected by this trouble is the grain, and with only little external appearance of "blighting" the grain is always found to be pinched and so of low bushel weight.

WHEAT VARIETY TESTS AT BUTLER.

Besides the above manurial plots, Mr. Jericho is conducting wheat variety tests, each variety being sown on fallowed land at 1 bush. seed to the acre, with 1 cwt. superphosphate. As this is the first season of these tests on this farm, the results are no more than comparisons for the particular conditions of the season, and are to be found below:—

Yields of Varieties.—Butler, 1917.

	Grain per Acre.	
	Bush.	lbs.
Gluyas	21	24
Queen Fan	18	2
Caliph	17	59
College Eclipse	16	43
Yandilla King	13	38
King's Red	12	40

All of the above varieties suffered more or less from red rust, but, as usual, Gluyas proved itself a good "resister" to this disease, and came out top yielder, producing grain of first class quality. King's Red made very heavy and strong growth and took the rust very badly in consequence, and the lowness of the yield from this variety was due to the poorness of the grain because of the disease rather than to the lack of grain. Queen Fan was growing alongside of the King's Red, and in consequence was very badly affected by rust on that side, and was comparatively free on the remainder of the plot.

EXPERIMENTS AT WILKAWATT.

[Conducted by Mr. W. J. Tylor.]

In 1914 tests with the manuring of wheat on comparatively poor soil at Wilkawatt were commenced, and for that year and the succeeding one, the plots were of a preliminary nature to point the way to the best type of experiments for the particular conditions of the district. In 1916 the treatment to be given the various plots was more or less definitely laid down and was continued on the same lines this year. Below will be found the returns for the plots for each of the years, together with the means of the two:—

Yields of Manurial Plots.—Wilkawatt, 1916-1917.

Plot.	Manuring per Acre.	1916.	1917.	Means 1916-1917.
		Bush. lbs.	Bush. lbs.	Bush. lbs.
1	½wt. superphosphate	12 49	7 31	10 10
2	1wt. superphosphate	13 42	8 47	11 14
3	2cwts. superphosphate	19 39	11 13	15 26
4	1wt. basic slag	12 32	9 12	10 52
5	No manure	12 6	6 40	9 23
6	2cwts. basic slag	18 56	9 37	14 16
7	2cwts. superphosphate, ½wt. nitrate of soda (spring)	22 17	13 12	17 49
8	2cwts. superphosphate, ½wt. sulphate of potash (seeding)	21 7	12 16	*—
9	2cwts. superphosphate, ½wt. nitrate of soda, ½wt. sulphate of potash, 5cwts. lime....	21 18	16 6	*—
10	5cwts. lime	14 49	12 59	13 54
11	5cwts. lime, 2cwts. superphosphate	18 37	13 2	15 49

* No sulphate of potash in 1917.

In 1916 Baroota Wonder wheat was used at 1bush. to the acre, and in 1917 Gluyas was sown at the same rate of seeding.

Manurial plots worked on the bare fallow-wheat-pasture system of rotation.

For the past four years, 1914-1917, the following plots have been manured with the same quantities, and for that period, which included the worst and the best wheat years that the State has seen, the results obtained certainly

show the advantage of using a dressing of up to 1cwt. superphosphate to the acre :—

Plot.	Manure per Acre.	Grain per Acre.				
		1914.	1915.	1916.	1917.	Means 1914-1917.
		Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.
5	No manure	1 11	8 43	12 6	6 40	7 10
1	½cwt. superphosphate	3 34	9 16	12 49	7 31	8 17
2	1cwt. superphosphate	3 56	15 17	13 42	8 47	10 25

The above average yields show a decided increase for the use of superphosphate, and if we take the manure to cost 5s. per hundredweight on the farm, and the wheat received to be worth 3s. 3d. per bushel on the farm, the money value of the increase is easily found. In the table below will be seen the increased yield of grain from the use of superphosphate at Wilkawatt with the net value of the increase :—

Plot.	Manuring per Acre.	Yields 1914-1917.	Increase over No Manure.	Net Value of Increase per Acre.
		Bush. lbs.	Bush. lbs.	£ s. d.
5	No manure	7 10	—	—
1	½cwt. superphosphate	8 17	1 7	0 1 2
2	1cwt. superphosphate	10 25	3 15	0 5 7

Besides the above plots that have been conducted for four years there are a number from which we have results for the past three seasons, and the greater the number of seasons showing results the greater the value of the results. They are set out below :—

Plot.	Manuring per Acre.	1915.	1916.	1917.	Means 1916-1917.
		Bush. lbs.	Bush. lbs.	Bush. lbs.	Bush. lbs.
5	No manure	8 43	12 6	6 40	9 10
1	½cwt. superphosphate	9 16	12 49	7 31	9 52
2	1cwt. superphosphate	15 17	13 42	8 47	12 35
3	2cwts. superphosphate	21 8	19 39	11 13	17 20
4	1cwt. basic slag	11 38	12 32	9 12	11 7
6	2cwts. basic slag	13 37	18 56	9 37	14 3

These results again show the increased yield by using 1cwt. superphosphate ; but more marked still is the very much greater increase of grain by increasing the superphosphate to 2cwts. to the acre. For the period 1915-1917 the extra hundredweight of fertiliser applied at the cost of 5s. per acre has given an average annual increase of about 5bush. to the acre, worth on the farm about 16s. 3d.

THE COST OF EGG PRODUCTION.

TEST CONDUCTED AT THE PARAFIELD POULTRY
STATION, 1917.

[By D. F. LAURIE, Poultry Expert.]

Cost of production is a vital point in commercial poultry-farming. Many breeders miss this point in an endeavor to overestimate egg production. Perhaps it would not be unreasonable to state that a good many breeders do not give proper consideration to the various points which are important in the matter of feeding for egg production. Under feeding is noted occasionally, but only in cases where the birds run at large, and no attempt is made to feed for any definite purpose. Overfeeding and feeding at too high cost are the common errors. In old times it was customary to allow poultry unlimited range. The bulk of their food, at some seasons, was gained by foraging in the fields and gardens, and in the neighborhood of barns, haystacks, &c. When natural food became scarce a little grain, generally just sufficient for bare maintenance, was added. Later on the use of soft food or mash became the custom. In many parts the common belief is that fowls must have concentrated foods, and certain grains and mill by-products are alone believed to be of any value. Green feed and vegetable food, other than grain, were generally given as a delicacy—a sort of salad. The economy of using fodder crops, green or cured, is still misunderstood by the majority of breeders. All stock like a full feed. Green food supplies bulk, and cheap bulk. It also supplies the invaluable mineral salts, in the absence of which no stock can thrive for any length of time. There is without doubt a foolish prejudice, due to ignorance, in regard to the free use of lucerne and other green food. Those who talk about bad effects on the egg do so in ignorance of the fact that from green food we get much of the coloring matter necessary for eggs with rich yolks. In the green, succulent growths we gain an additional and invaluable water supply, especially valuable in hot weather. The water in the bodies of poultry and the water content of eggs is about 65 per cent., and a shortage of water and great heat with the absence of green food mean less water in the eggs, and therefore smaller and lighter eggs. The economical aspect is important, and to test the matter on a fair scale a flock of 450*White Leghorn pullets hatched in April and May, 1917, were used in a feeding test lasting one month, in November and December, 1917. Many of the pullets had not laid or had only just started. The market price at Adelaide during the period of the test averaged 6½d. a dozen. It is freely stated that eggs cannot be produced at a profit if sold at this figure. In the test, held chaffed green lucerne formed by bulk 60 per cent. of the morning mash, and in addition a little scalded lucerne hay chaff was mixed in the mash. To afford some contrast figures were used, which were taken from the 1913-14 laying competition, as regards the feeding of 450 White Leghorn hens. In the competition feeding

just half the quantity of green lucerne was fed. It must be explained that the item "green feed" includes the chaffed green food fed at mid-day as well as that included in the morning mash. Comparing the cost of the two methods of feeding it is seen that the Parafield feeding test cost £8 2s. to feed 450 pullets, and the laying competition figures amount to £9 10s. 9d. The Parafield feeding test thus shows how to save £1 8s. 9d. every four weeks, or 7s. 2½d. a week on the feeding of 450 hens. Hens eat about 10 per cent. more by bulk of the 60 per cent. green food ration.

COST PER EGG OR PER DOZEN.

We hear all sorts of opinions expressed as to the cost per egg or per dozen, and it is commonly stated that there is no profit in eggs when the price is less than 9d. a dozen. During the period under review the 450 pullets which were not yet in their stride laid 6,620 eggs. At the Adelaide market rate which ruled throughout the period of the test the value of these eggs at 6½d. per dozen amounts to £14 8s. 6d. We have already seen that the cost of feeding these 450 pullets for four weeks was £8 2s., therefore the profit over cost of feeding is £6 6s. 6d., or £1 11s. 7½d. per week. The cost of food which was fed for each egg laid was approximately .3d., and the cost per dozen 3.52d.

Table I. shows the exact weights of all the food used in the Parafield feeding test, and the cost at which it was purchased. The weights of food used in the laying competition, Table II., are those actually used, but the prices of each commodity have been fixed at the same as those paid for the foods used in the Parafield feeding test. This was necessary, of course, in order to bring out the contrast between feeding on one-third by bulk of green food as compared with the Parafield test of three-fifths green food by bulk. Green food, particularly lucerne, can be grown cheaply in numerous localities. Lucerne hay chaff can also be purchased, and has the same feeding value although in a more concentrated form.

The test under review was of course a wet mash test, and accentuates my long-held opinion that where green food is grown in quantity the cost of food under the wet mash system is far less than under the dry mash method. It is intended to carry out a series of tests on a large scale, including various wet mash, dry mash, and grain mixtures.

REPORT OF THE SUPERINTENDENT PARAFIELD POULTRY STATION.

The Superintendent of the Parafield Station reports as follows:—
"The period during which the various foods were separately weighed for this flock of 450 pullets was November 15th to December 14th, both days inclusive. The weather was hot during the daytime, and cold at nights, with heavy driving east-south-east winds at night and early morning, which no doubt to some extent checked egg production. During the test rain fell on six days, with a total rainfall of 1in. 11 points. The birds were housed in one of the large scratching sheds, with a capacity of 500 White Leghorn pullets. They were hatched during April-May, 1917. The feed used was bran, pollard, meat meal, green food, lucerne chaff, wheat, and salt. The birds laid during the

test, 6,620 eggs in 30 days. The birds were fed on mash in the mornings at 7 o'clock, consisting of 6lbs. bran, 15lbs. pollard, 3½lbs. meat meal, 40lbs. green food, 3lbs. lucerne chaff, 5ozs. salt. You will notice green food is the most important factor in the mash. The bulk of the above is as follows, an ordinary kerosine tin taken as a measure:—Bran, 2galls.; pollard, 3galls.; meat meal, 1/16gall.; green food, 13galls.; salt, 2ozs. The mash was mixed to a crumbly mass and fed to the birds. Bran, meat meal, and salt were soaked in warm water, and allowed to stand for about 20 minutes. If this is not done the mash is useless. At mid-day chaffed green food was the only food used, three kerosine tins full—12galls. In the evening 60lbs. of wheat were consumed by the birds. The health of the birds has been good; no illness was detected during the test."

Table I.—Parafield Feeding Test, 1917.

Food.	Quantity.	Cost.
		£ s. d.
Bran	9bush. at 1s.	0 9 0
Pollard	22½bush. at 1s. 2d.	1 6 1
Meat meal	1cwt. at 18s. 6d.	0 18 6
Greenfeed	20½cwt. at 9d.	0 15 7
Lucerne chaff	½cwt. at 3s.	0 2 3
Wheat	30bush. at 3s.	4 10 0
Salt	10lbs. at 6s. cwt.	0 0 7
		£8 2 0

Table II.—1913-14 Competition.

Bran	18bush. at 1s.	0 18 0
Pollard	38½bush. at 1s. 2d.	2 6 1
Meat meal	190lbs. at 18s. 6d. cwt.	1 11 5
Greenfeed	10cwt. at 9d.	0 7 6
Lucerne chaff	66lbs. at 3s. cwt.	0 1 9
Wheat	28½bush. at 3s.	4 6 0
		£9 10 9

Parafield Feeding Test, 1917.

Number of eggs laid	6,620
Value at 6½d. per dozen	£14 8 6
Total cost of food	£8 2 0
Profit over cost of food	£6 6 6
Cost of competition feeding	£9 10 9
Saving over competition feeding by using increased greenfeed	£1 8 9



Harvesting Trials carried out at Paskeville under the auspices of the Northern Yorke's Peninsula Branches of the Agricultural Bureau.
[H. V. Pelt, Photo.]
The picture shows the scene on the grounds.

HARVESTING MACHINERY.

FIELD DEMONSTRATION AT PASKEVILLE.

The value of the Agricultural Bureau cannot be set down in figures, but if the interest taken in its activities by farmers on Yorke Peninsula can be accepted as an indication, its importance to the agriculturist must be indeed considerable.

On Wednesday, January 24th, a field demonstration was held at Paskeville, there being present about 1,000 farmers and other interested persons. Visitors from as far south as Adelaide and north as far as Crystal Brook attended, and throughout the day a keen interest was manifest in the proceedings.

The trial was held on the grounds of the Northern Yorke Peninsula Agricultural Bureau Field Trial and Show Society, which society consists of an amalgamation of six Branches of the Bureau, viz., Arthurton, Bute, Kadina, Paskeville, Pine Forest, and Port Broughton. Contrary to the usual procedure there was no official adjudication; the public was left to draw its own conclusions. Keen interest was taken in the work done by the various machines on the ground. In all eight were set to work, first on an area of crop of which each took a few rounds, and subsequently on separate areas of about an acre in extent. The 10ft. Sunshine harvester, Massey-Harris reaper thresher, Deering reaper thresher, May's 10½ft. Acme harvester, Federal Big E, May's 7ft. Premier, David Shearer & Co.'s 8ft. harvester, and an 8ft. engine-functioned Sunshine were worked. Keen interest was shown in the manner in which each handled the crop, and small groups of farmers at different parts of the ground vigorously debated the merits of the machines.

On the Chairman of the local Branch of the Bureau (Mr. Charles S. Lee) the greater part of the work fell, and the able support afforded by Messrs. J. P. Pontifex (President of the Society), T. H. Price, J. H. Price, G. H. Bamman, J. H. Bussenschutt, and J. R. Brinkworth assured the success of the fixture. Messrs. Tossell and Allen, M'sP. were present, and the Department of Agriculture was represented by the Principal of the Roseworthy Agricultural College (Mr. W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S.), Mr. John Miller (Advisory Board), Mr. Williams (Farm Mechanic Roseworthy Agricultural College), and Mr. H. J. Finnis (Acting Secretary Advisory Board).

WHEAT STORAGE PROBLEMS.

TREATMENT OF DAMAGED GRAIN.

The serious plague of mice which occurred last season in New South Wales, Victoria, and South Australia resulted in considerable damage to the wheat stored at inland centres. Whilst a certain proportion of the wheat was devoured by the rodents a considerable quantity was damaged or tainted. Some stored wheat was also damaged owing to rain and the attacks of weevils.

The problem, therefore, arose as to the best method for treating such damaged grain to prevent further deterioration, and, if possible, to purify it so that it could be utilised for food purposes. In July, 1917, the Executive Committee of the Commonwealth Advisory Council of Science and Industry had an interview with Mr. A. O. Barrett, who has had considerable experience with grain in bag stacks, and he outlined a scheme whereby wheat should be stored in special silos after mixing with quicklime. He claimed that this lime treatment has the following advantages:—(1) It dries ordinary f.a.q. wheat, thus rendering it less liable to attacks of weevils, and at the same time improving its milling qualities; (2) it destroys the smell of mouse-tainted or smutty wheat, and sterilises the outside of the grain; (3) it removes the smell of damp, musty wheat and arrests further deterioration by fungus pests; (4) it inhibits the growth of weevils in wheat already infested and prevents them from developing. These statements were supported by the exhibition of samples of damaged wheat which had been purified in the manner indicated on a laboratory scale.

The Executive Committee thereupon appointed Professor D. Orme Masson, F.R.S., Professor of Chemistry; Dr. W. Heber Green, Lecturer in Agricultural Chemistry; and Dr. W. J. Bull, Lecturer in Bacteriology in the University of Melbourne; together with Professor T. R. Lyle, F.R.S., to carry out tests of the effects of quicklime on damaged grain on a larger scale, and gratefully accepted Mr. Barrett's offer to allow experiments to be undertaken at the firm's maltings at Richmond. The report on these experiments forms the main part of Bulletin No. 5, recently issued by the Advisory Council of Science and Industry.

Various samples of wheat, including (1) good, (2) weevily, (3) tainted, (4) damp and damaged, (5) mousey, were treated first by passing each lot through a small sized Eureka wheat-cleaning machine. The cleaned wheat was then weighed and mixed with 1 per cent. of its weight of quicklime, then stored for about 14 days. The good wheat f.a.q. (Federation type) parted with a considerable amount of moisture, and the general effect was that the addition of quicklime to sound grain is in no way harmful, and may be expected to produce some slight improvement. All weevils in the adult stage and practically all grain attacked were removed upon screening the weevily wheat, but the weevils were not killed. It is only by adding lime at a

high temperature under the conditions of Mr. Barrett's scheme that this is effected. The tainted wheat lost nearly 20 per cent. upon being screened, and the pronounced mousey and musty odor was considerably reduced, but before the work of the lime could be completed it would require to be applied fresh and hot and left in contact for some months. The damp wheat, although not so bad as the previous wheat, was yet incapable of being converted into a wholesome article, though the lime had materially reduced the smell and bacteria present. The mousey wheat was treated with freshly ignited lime, and the results proved very satisfactory, showing conclusively that the lime, to be effective, must be applied hot. The bacteriological and chemical examinations made of the lime-treated wheat clearly indicate that considerable improvement has been effected.

The bulletin which gives full details of these experiments may be obtained post free from the Secretary of the Advisory Council, 314, Albert Street, East Melbourne.

THE PROTECTION OF WHEAT FROM WEEVILS.

The problems affecting wheat storage or, as it might be more accurately described, wheat preservation, are of extreme urgency in view of the prospect of a serious shortage in the food supply of the world as one of the results of the war, and it is obviously a matter of exceptional importance to prevent, as far as possible, the destruction and loss of grain in store through the ravages of pests.

Recognising this the British Government asked the Royal Society of London to arrange an investigation into the damage done by insects to grain in store throughout the Empire.

The Executive Committee of the Commonwealth Advisory Council of Science and Industry received, through the Prime Minister's Department, in October, 1916, a request from the Royal Society that a committee should be appointed in Australia to co-operate with similar committees in England and Canada in this investigation. Reports were obtained from the Government Entomologists of each State, and it was shown that considerable losses were caused annually in Australia from grain weevils and other pests. The Executive Committee thereupon appointed a special committee to make further investigations.

This special committee included Mr. Leo Rossell, representing the milling industry; Professor W. A. Haswell, F.R.S., Professor of Zoology in the University of Sydney; and Mr. W. W. Froggatt, Government Entomologist, New South Wales. Mr. F. B. Guthrie, Chemist to the Department of Agriculture of New South Wales, subsequently joined the committee. The progress report prepared by this special committee has now been published in Bulletin 5 of the Advisory Council, and can be obtained post free from the Secretary, 314, Albert Street, East Melbourne. The report indicates that only the two grain weevils (*Calandra granaria* and *C. oryzae*) demand special measures on account of their destructive effects on stored grain, that the development of weevils in wheat and their increase in number

may be checked by not using old bags which may be weevil-infested or storing in buildings likewise infested, and that bags of weevil-infested wheat should not be brought into contact or near that which is sound, for before wheat can become infested there must be a female to lay her eggs in the grains of wheat. It is only when the perfect insect, after going through the various stages of its larval existence, emerges through a tiny hole in the grain that the damage is evident, and except during the pupating state destruction is going on during the whole life of the insect. Under suitable conditions it takes from 19 to 22 days from the egg to the adult beetle, and in three months in one experiment 40 weevils produced 3,056 descendants. Under the present system of handling wheat the destruction of weevil, once it has gained access to the bagged grain, seems hopeless. Many methods of fumigating grain have been tried, and so far the most effective is that of poisoning with the fumes of carbon dioxide; but with bagged wheat this is not applicable, save at a prohibitive cost. Sun-dried wheat contains only 4.7 per cent. of moisture. Neither in this nor in wheat as it emerges from the thresher with a moisture content up to 6.7 per cent. will weevil breed. With 8 per cent. of moisture they died in six weeks without breeding, at 9 per cent. they remained dormant, but with anything above the latter, provided they had free air, they became active and bred. It would thus appear that dry wheat stored in air-tight bins is immune from the attack of weevils. Wheat when first bagged does not, under ordinary circumstances, contain sufficient moisture to enable weevils to breed, therefore, unless moisture is added from without, the grain remains weevil proof. Thus if stored in a fairly dry climate, completely protected from the weather, it is certain that wheat may be stored for an indefinite period without any damage from weevil.

FODDERS FOR LIVESTOCK.

The millets are not usually considered to be poisonous to stock in their early stages, as are the sorghums, says the Superintendent of Experiments (Mr. W. J. Spafford), in reply to a correspondent. They can be fed with comparative safety any time during their growth. It is well to remember, however, that it is always better to put livestock on to a feed new to them on a full stomach.

Of the livestock fodders mentioned, the following should be sown in the autumn:—Evening Primrose, Sheep's Parsley, Giant Spurrey, King Island Melilot. The remaining one, Guinea Grass, is so liable to be cut by frosts that it should not be sown until the early spring.

King Island Melilot can be fed at any time during its growth, but as it gets fairly hard and woody once the seeds have set, it should not be left later than flowering stage to put stock on to it.

The millets can all be grazed for livestock, but as they are only annuals, they must not be over-fed, otherwise the stand is much thinned after each feeding owing to plants being killed by the stock.

POTASH—ITS NEED AND SOURCES.

Prior to the war the German Kali or Potash Syndicate absolutely controlled the potash industries of the world, the output from the famous mine at Stassfurt alone being nearly £6,000,000 worth of material a year. The hold that had been secured was quickly made manifest, for as accumulated stocks became exhausted the prices of all potash salts advanced to a very high figure. Caustic potash advanced from £36 per ton to £400 per ton. Pearl ash, potassium chloride, and sulphate are unprocurable. The effect of this has been felt in all industries requiring potash, and in agriculture the position is really serious, for as potassium sulphate, which is the principal compound used as the source of potash in fertilizing manures, is practically unobtainable, this necessary and important salt is left out of all fertilizers at present on the market.

All authorities agree that potash is essential for the maintenance of the soil's fertility, and to show the justification for this agreement, and the serious results that will ensue by the removal of potash from fertilizing mixtures, the results of experimental plots of potatoes will be of interest. Using the ordinary fertilizing mixture without potash a yield of only 2 tons 16cwts. was obtained, as against 8 tons to 10 tons per acre with potash present.

In experiments with mangel-wurzels, by the addition of potash the total yield was increased from 12 to 29 tons, and the sugar yield from 0.797 ton to 2.223 tons. All soils excepting volcanic and granitic in the virgin state require potash. Plants which secrete quantities of sugar, starch, and other carbohydrates, such as beets, sorghum, potatoes, onions, maize, likewise the various kinds of fruits, require much potash for their development.

Apart from the increased yields by the addition of potash, it is specially noteworthy that its presence imparts increased vigor to plants, and thus enables them to resist diseases to which they may be subject. We, in Australia, are drawing on the reserves of potash present in the soil, and it may, in some cases, be some time before its loss is made manifest; but already in Queensland, where pineapples and bananas are grown, the reserve is exhausted. In the fruit-growing districts of New South Wales, also, these crops are suffering from the lack of potash.

The position is, no doubt, serious, but remediable, for the sources from which potash may be obtained are many and various. In Europe and America efforts are being made to establish the potash industry, and investigations instituted in order to secure the necessary salts under the most economical conditions. In Australia the matter has been engaging the attention of the Commonwealth Advisory Council of Science and Industry. The chief possible sources of potash are:—

- (1) The ashes of various plants, seaweeds; (2) the water in which sheep's wool has been scoured; (3) brines and residues of salt lakes; (4) residues from the manufacture of cane sugar, &c.; (5) fume, as

obtained from cement works as flue dust; (6) potash-bearing rocks, as alunite, leucite, feldspar, mica, &c.

The Council came to the conclusion that of all these possible sources alunite was the most immediately promising. It was necessary, however, first to ascertain by experiment the best method of extracting potash from the local deposits of this mineral, since each deposit of alunite varies somewhat in composition, necessitating differences in treatment. The experiments were carried out at the Melbourne University by Mr. F. W. Janes, working under a committee consisting of Mr. A. J. Higgin (Lecturer in Metallurgy), Professor Orme Masson (Professor of Chemistry), and Mr. V. G. Anderson. The results of the experiments, together with much information as to alunite, and especially as to the deposits in Australia, have now been published as Bulletin 3 of the Advisory Council, which can be obtained post free from the Secretary at 314, Albert Street, East Melbourne.

There are at present three known deposits of alunite in Australia, two being in South Australia—one at Carrickalinga Head, on St. Vincent Gulf, about 40 miles south of Adelaide, and the other near Warnertown, 17 miles from Port Pirie.

The alunite from Carrickalinga Head is of exceptional purity and evenness of composition, with a high and very uniform potash value. In the deposit at Warnertown, though of high grade, the proportion of soda to potash somewhat diminishes its value. The third, which has been described as the biggest deposit of alunite in the world, and from which shipments have been made to England for many years, is found at Bullahdelah, New South Wales, about 60 miles north of Newcastle. Alunite is a hydrous sulphate of aluminium and potassium, but, generally speaking, it contains, in addition, sodium, silica, oxide of iron, lime, magnesia, chlorine, and phosphoric acid. It usually occurs as a massive, finely granular rock, or in nodular masses, varying in color from white to red, according to the nature and extent of the impurities present, the pure mineral being white. It is insoluble in all acids, except strong sulphuric acid, upon heating, but is readily soluble in caustic alkalies. Under varying methods of treatment, and at different temperatures, it yields products of considerable industrial importance, such as potash alum, aluminium sulphate, alumina, potassium sulphate, and sulphuric acid. As potash for fertilization is perhaps at present the most necessitous of our requirements, it may be pointed out that the results of experiments carried out by the Bureau of Soils, Washington, U.S.A., show that roasted alunite was on the average more effective than either high-grade potassium sulphate or chloride. The increase of crops resulting from the addition of raw alunite was 14 per cent., roasted alunite gave 40 per cent., and potassium sulphate and chloride showed about 38 per cent. and 31 per cent. respectively, corresponding amounts of potash being used in each case. The best results were secured with from 50lbs. to 100lbs. per acre. These facts indicate that we have at our disposal a fertilizer for the supply of the much-needed potash salts.

The Bullahdelah deposits are in a most favorable position to furnish a product of this description, and can be treated at a low cost. The

plant required would not involve a large outlay of capital, and the process is so simple that no difficulty should be found in successfully carrying it out from the start. It should at the same time be recognized that the ultimate success of this industry depends on the treatment to be accorded to the German Potash Syndicate in the future. If the German imports are stopped, or the supply of potash is not available as at present, then alunite offers the simplest solution of the problem for the quick production of a high-grade product at a reasonable outlay, with every guarantee of success. The problem is not so much a chemical or mechanical as an economic one. Given favorable conditions, Australia should be easily able to supply her needs of potash salts without delay from her deposits of the mineral alunite.

ADVISORY BOARD OF AGRICULTURE.

The monthly meeting of the Advisory Board of Agriculture was held on Wednesday, January 9th, there being present Messrs. Geo. Jeffrey (in the chair), J. Miller, C. J. Tuckwell, F. Coleman, A. M. Dawkins, W. J. Colebatch, B.Sc. (Agric.), M.R.C.V.S., and the Acting Secretary (H. J. Finnis). Apologies were received for the absence of Professor Perkins, Senator Col. Rowell, C.B., Messrs. G. Laffer, M.P., A. W. Shillabeer, and T. H. Williams.

LICENSING WEIGHBRIDGES.

It was decided to ascertain from the Local Government Department how many of the local governing bodies had adopted the model by-law which provided for the licensing of weighbridges.

NOXIOUS WEEDS.

Consideration was given to the following resolution from the 1917 annual congress dealing with the question of the destruction of noxious weeds:—"That the administration of the Noxious Weeds Act should be vested in the district councils, with independent Government authority behind, and that a schedule of noxious weeds should be prepared on the recommendation of a select committee." It was decided that this should be forwarded to the Hon. the Minister of Agriculture, together with a copy of a report prepared by the Board on June 12th, 1912. The attention of the Minister was to be drawn to the fact that apparently the matter had not been dealt with.

WEIGHING WHEAT IN BULK.

A resolution passed by the 1917 Congress to the effect that the Board should impress on the Government the necessity for installing the weighbridge system of weighing wheat at railway stations was received. It was decided that the matter should be left in abeyance pending the settlement of the bulk handling question.

MUSEUM FOR IRRIGATION AREAS.

From the Horticultural Instructor the following report was received on the suggestion of the Ramco Branch that a museum of vine and tree diseases be placed at all irrigation areas to facilitate identification:—"In respect to this matter, I wish to state that whilst fully

seized of the value of every means, such as this, for educating the fruit and vine growers, there are difficulties in relation to carrying it into effect that are not generally realized. In those States which possess in their Agricultural Departments well-equipped entomological and pathological branches, such a request as that contained in the above could be met and sustained; but here, where we have no entomological branch, and only a consulting pathologist, whose time is much occupied by professorial work, I see little chance of meeting the suggestion for the establishment of even a small museum, &c., at each irrigation area. It is true collections of common forms of animal and vegetable parasites might be set up in cases in the district irrigation offices, but unless these were attended to with unremitting care, the ravages of cabinet insects, mould, fungi, &c., would render necessary the renewal of the whole of the specimens almost every year. At present this branch would find it extremely difficult to attempt this work, but we are constantly attending by correspondence to the needs of the settlers on the subjects mentioned in the suggestion."

ALTERATION OF NAME OF BRANCH.

The Board approved of the request that the name of the McNamara Bore Branch should be altered to "Nunkeri and Yurgo."

RABBIT-CANNING FACTORY.

It was decided to forward to the Director of Agriculture the suggestion that the Government should be asked to erect a rabbit-canning plant at Murat Bay.

LECTURES BY DEPARTMENTAL OFFICERS AT AGRICULTURAL HIGH SCHOOLS.

The Board decided to recommend that the services of the expert officers should be made available for the purpose of delivering lectures at Agricultural High Schools.

ALTERATION OF PLACE OF MEETING OF BRANCH.

The suggested alteration of the place of meeting of the Koonibba Branch was considered, and it was decided that in view of the circumstances it would be well to endeavor to have an additional Branch formed in the district.

NEW MEMBERS.

The following names were added to the list of Branches mentioned below:—Redhill—L. Longmire; Millicent—W. J. Major; Renmark—J. A. Smith; Beetaloo Valley—H. Boehm; Waikerie—E. Crabbe; L. G. Heming; Mount Remarkable—T. V. Andrew, T. Graham, H. Cameron, A. Scott, M. Christopherson, E. F. Kennett, T. D. Davies, A. E. Kendall, G. E. Hopgood, R. V. Potter, J. Whitford, H. H. Bulbeck, Chas. Dinham; Goode—J. B. Hughes, Alb. Skinner; Murray Bridge—W. Lind, E. Jenkins, J. T. Christensen; Minnipa—G. D. Bache, H. H. Hardy, R. R. Edwards; Mount Gambier—F. Aslin, E. Tolner, F. Martin; Ashbourne—A. Cameron, A. Beviss, R. Haines, K. Kirkham, W. H. Cuming, —Fitzpatrick, W. Carter, H. Payne, H. Sessions, G. Sessions; Talia—Ed. Wheaton; Tatiara—Jas. Pearce, J. Stronach.

DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, report on February 1st:—

BUTTER.—The extreme heat experienced during January had a telling effect on the condition and quality of butters, a big proportion of the arrivals being second and third grade, which caused a heavy shortage in top qualities, so that it has been necessary to bring along importations from the neighboring States to fill local trade requirements. Demand throughout the month has been very brisk for tops, but seconds and thirds have found a slow sale, so that the surplus has been packed for export. At the close of the month "Alfa" realised 1s. 7d.; "Primus," 1s. 6½d.; third-grade creamery, 1s. 2d. to 1s. 2½d.; choice separators and dairies, 1s. 2d. to 1s. 4d.; fair quality, 1s. 0½d. to 1s. 1½d.; weather-affected lots, 11d. to 11½d. per lb.

EGGS.—Heavy quantities continue to come along, but owing to the hot weather many lots have opened up in poor condition, and buyers have been somewhat critical in their operations. Values eased a halfpenny; hen selling at 6d.; duck, 7d. per dozen.

CHEESE.—Slight fluctuations occurred in this line, consignments from the South-East being exceptionally heavy, but as a proportion is now arriving in the 40lb. size for the Imperial Government, this should steady the market in the near future. Rates at the end of the month were 7½d. to 8d. per lb. for large to loaf.

HONEY.—Fair turnover has been experienced without any quotable alteration in values; prime clear extracted selling at 4d.; second grades down to 3d.; beeswax very saleable at 2s. per lb.

ALMONDS are practically off the market, and purchasers are already asking for quotations for the new crop.

BACON.—Almost up to the end of the month values in bacon were unaltered, when the sharp advance in the live market caused prices to harden, so that values at the close of January were:—Best factory-cured sides, 10d. to 10½d.; hams, 1s. 2d. to 1s. 3d. per lb. There is absolutely no demand for farm-cured lots.

LIVE POULTRY.—Supplies have kept up remarkably well, and it is pleasing to report that demand has been quite equal to all submitted, with prices well maintaining. Heavy-weight table roosters, 3s. 6d. to 4s. 6d. each; nice-conditioned cockerels, 2s. 6d. to 3s. 3d.; plump hens, 2s. to 3s. 4d.; light birds, 1s. 7d. to 1s. 11d.; ducks, 1s. 6d. to 3s.; geese, 3s. 6d. to 4s. 2½d.; pigeons, 6d. each; turkeys from 10½d. to 1s. per lb. live weight for fair to good table birds.

POTATOES.—Digging began during the present month in the Mount Gambier district, and for the time of year fair quantities have been railed to the Adelaide market. These supplies have naturally had a depressing effect on values, and potatoes to-day are changing hands at a good £5 per ton lower than was the case at the beginning of January. **ONIONS.**—There are plenty of locally-grown onions offering, and values are a shade lower than in any of the other principal centres of Australia. **Quotations.**—Potatoes, £6 10s. per ton on rails Mile End or Port Adelaide. Onions, 5s. to 6s. per cwt. delivered in the Adelaide market.

THE AGRICULTURAL OUTLOOK.

REPORT FOR MONTH OF JANUARY.

The following reports on the general agricultural condition and outlook of the areas represented by the Government Experimental Farms mentioned below have been prepared by the respective managers:—

Booborowie.—Weather—Good seasonable weather has been experienced with a few hot days, the temperature rising to 100deg. On January 28th a steady rain fell, which registered 59 points; the last few days being cloudy and cool. Crops—The bulk of the wheat has been reaped, and the yields on the whole are fairly satisfactory, but not nearly as heavy as last year. Natural Feed—Dry grass is plentiful. Stock—Young sheep are troubled with grass seeds, and are not doing as well as they should. Miscellaneous—The springs and soakages still continue to run, even in places where they were unknown before.

Eyre's Peninsula.—Weather has been fine and dry, eight or nine real hot days being experienced. One small thunderstorm was experienced early in the month, registering 18 points rain, so that the month has been much drier than the three previous Januarys. A fair amount of wind has been experienced, the greater proportion coming from the south and west, the cooler quarters. Crops are practically all harvested, and wheat-garting is general. A fair amount of straw and chaff is being conserved. The wheat average for the hundred is approximately 20bush. Natural Feed—Plentiful, but dry.

Kybybolite.—Weather conditions have, as is usual in this month, been particularly dry, and this following an unusually dry December. Crops have all been harvested, but the yields are negligible. Summer crops have suffered through the unusually long dry spell, but on the black soils of the plains have done remarkably well. Kale crops of this season's planting are well established. Natural feed is plentiful, but seems of more inferior quality than usual. Sorrel has been a great standby for the sheep. Stock—Horses and cattle still in fairly good order; sheep, fair to good, scabby feet and mouths prevalent, and various other minor complaints have caused some trouble. Pests—Rabbits are very plentiful.

Turretfield.—Weather—January was a warm to hot month, the weather being very favorable for harvesting operations. The only rain recorded was 25 points, registered on the 17th. Crops—Stripping has in most cases been completed, and farmers are busy with cleaning operations. Yields are not turning out heavy, but the sample, generally speaking, is good. Yandilla King is practically the only variety in the district that has yielded a slightly shrivelled grain. Probably the first hot weather caught this wheat at a critical stage. Natural feed is still plentiful, though fields that are regularly stocked are showing signs of depletion. Stock are keeping in fairly good condition. Mares with foals at foot are falling away a little in condition, and hand feeding is necessary as a supplement to the natural grass. Pests—Grasshoppers were numerous for a few days early in the month, but they passed without doing any perceptible damage. Rats are fairly numerous. A few shell parrots have also been noticed.

Veitch.—Weather—We have had a few warm days during this month, but the weather has given every chance for good harvesting work. Crops—Harvesting operations in this district are now well in hand, and a finish should be made in good time this year. The yields throughout the district will not be as satisfactory as last season, but in some cases good returns are showing. The grain sample in most cases is slightly pinched. Natural feed—Drying off; good stubble feed is now available. Stock—All in healthy condition. Pests—Nothing troublesome, but rabbits will soon need attention. Miscellaneous—Wheat agents are now kept busy at the Veitch siding, and a good quantity will be carted in this year. A number of fires have started in the district, but very little damage has resulted.

RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall at the subjoined stations for the month of and to the end of January, 1918, also the average precipitation to the end of January, 1918, and the average annual rainfall.

Station.	For Jan., 1918.	To end Jan., 1918.	Av'ge. to end Jan.	Av'ge. Annual Rainfall	Station.	For Jan., 1918.	To end Jan., 1918.	Av'ge. to end Jan.	Av'ge. Annual Rainfall
FAR NORTH AND UPPER NORTH.					LOWER NORTH—continued.				
Oodnadatta	0.95	0.95	0.66	4.76	Spalding	1.39	1.39	0.50	20.25
Tarcoola	0.22	0.22	0.27	7.58	Gulnare	1.08	1.08	0.35	19.74
Marree	0.95	0.95	0.44	6.04	Bundaleer W. Wks.	2.11	2.11	0.47	17.29
Parina	0.36	0.36	0.51	6.70	Yacka	0.42	0.42	0.49	15.27
Leigh's Creek	0.21	0.21	0.64	8.66	Koolunga	0.07	0.07	0.58	15.94
Bellana	0.29	0.29	0.69	9.22	Snowtown	0.09	0.09	0.61	15.70
Blinman	0.30	0.30	1.04	12.83	Brinkworth	1.06	1.06	0.36	15.48
Hookina	0.29	0.29	0.28	—	Blyth	0.28	0.28	0.67	16.34
Hawker	0.92	0.92	0.50	12.22	Clare	0.10	0.10	0.87	24.30
Wilson	—	—	0.57	11.78	Mintaro	0.18	0.18	0.53	21.99
Gordon	2.67	2.67	0.36	10.26	Watervale	0.11	0.11	0.88	27.17
Quorn	2.87	2.87	0.57	13.78	Anburn	0.11	0.11	1.00	24.25
Port Augusta	1.12	1.12	0.53	9.46	Hoyleton	0.11	0.11	0.76	17.96
Port Augusta W. ..	1.20	1.20	0.47	9.36	Balaklava	0.87	0.87	0.70	16.03
Bruce	1.42	1.42	0.33	10.01	Port Wakefield ..	0.04	0.04	0.55	13.13
Hammond	1.11	1.11	0.59	11.46	Terowie	0.70	0.70	0.67	13.71
Wilmington	2.61	2.61	0.80	18.26	Yarcowie	0.84	0.84	0.69	13.91
Willowia	0.67	0.67	0.34	11.90	Hallett	0.33	0.33	0.72	16.40
Melrose	2.24	2.24	1.23	23.04	Mount Bryan ..	0.18	0.18	0.48	15.73
Booderoo Centre ..	1.52	1.52	0.75	15.83	Burra	0.13	0.13	0.78	17.82
Port Germein	0.87	0.87	0.62	12.84	Farrell's Flat	—	—	0.77	18.87
Wirrabara	1.14	1.14	0.64	18.91	WEST OF MURRAY RANGE.				
Appila	1.04	1.04	0.60	15.08	Manoora	0.12	0.12	0.54	18.69
Craddock	0.01	0.01	0.53	10.86	Saddleworth	0.16	0.16	0.76	19.69
Carrieton	0.74	0.74	0.73	12.22	Marrabel	0.19	0.19	0.72	18.94
Johnburg	0.84	0.84	0.54	10.21	Riverton	0.06	0.06	0.77	20.48
Eurelia	1.21	1.21	0.69	13.24	Tarlee	0.26	0.26	0.79	17.48
Orroroo	1.28	1.28	1.00	13.42	Stockport	0.25	0.25	0.81	15.89
Black Rock	1.17	1.17	0.68	12.25	Hamley Bridge ..	0.27	0.27	0.83	16.45
Peterborough	0.83	0.83	0.78	13.07	Kapunda	0.15	0.15	0.86	19.67
Yongala	0.74	0.74	0.60	13.94	Freeling	0.25	0.25	0.78	17.85
NORTH-EAST.					Greenock	0.29	0.29	0.78	21.46
Ucoila	1.58	1.58	—	—	Truro	0.19	0.19	0.73	19.74
Nackara	1.85	1.85	0.36	—	Stockwell	0.11	0.11	0.74	20.30
Yunta	0.60	0.60	0.63	8.22	Nuriootpa	0.18	0.18	0.78	21.25
Waukaranga	0.83	0.83	0.48	7.94	Angaston	0.32	0.32	0.76	22.25
Mannahill	1.41	1.41	0.63	8.46	Tanunda	0.20	0.20	0.85	22.28
Cockburn	0.45	0.45	0.66	7.97	Lyndoch	0.27	0.27	0.75	23.01
Broken Hill, NSW	1.43	1.43	0.67	9.63	Williamstown ..	0.27	0.27	0.90	—
LOWER NORTH.					ADELAIDE PLAINS.				
Port Pirie	0.92	0.92	0.58	13.21	Mallala	0.30	0.30	0.76	16.88
Port Broughton ..	—	—	0.63	14.33	Roseworthy	0.19	0.19	0.74	17.31
Bute	0.07	0.07	0.64	15.42	Gawler	0.22	0.22	0.73	19.21
Lena	1.09	1.09	0.68	18.22	Two Wells	0.06	0.06	0.73	16.36
Cadowie	0.69	0.69	0.66	17.27	Virginia	0.28	0.28	0.74	17.58
Jamestown	0.43	0.43	0.63	17.46	Smithfield	0.38	0.38	0.49	17.80
Gladstone	1.15	1.15	0.62	16.00	Salisbury	0.44	0.44	0.74	18.57
Crystal Brook	0.31	0.31	0.63	15.62	North Adelaide ..	0.51	0.51	0.75	21.49
Georgetown	0.98	0.98	0.64	18.32	Adelaide	0.38	0.38	0.72	21.04
Narridy	0.29	0.29	0.57	16.79	Brighton	0.46	0.46	0.57	—
Redhill	0.26	0.26	0.52	16.79	Glenelg	0.21	0.21	0.63	—
					Magill	0.43	0.43	0.84	19.93

RAINFALL—continued.

Station.	For Jan., 1918.	To end Jan., 1918.	Av'ge. to end Jan.	Av'ge. Annual Rainfall	Station.	For Jan., 1918.	To end Jan., 1918.	Av'ge. to end Jan.	Av'ge. Annual Rainfall
ADELAIDE PLAINS—continued.					WEST OF SPENCER'S GULF—continued.				
Glen Osmond	0.70	0.70	1.00	25.26	Talia	—	—	0.13	—
Mitcham	0.64	0.64	0.84	23.47	Port Elliot	—	—	0.39	16.49
Belair	0.63	0.63	1.00	28.64	Port Lincoln	0.04	0.04	0.59	19.88
MOUNT LOFTY RANGES.					Tumby Bay	0.33	0.33	0.14	15.00
Teatree Gully	0.58	0.58	0.80	28.19	Carrow	0.02	0.02	—	—
Stirling West ...	1.39	1.39	1.47	46.70	Cowell	0.25	0.25	0.40	11.76
Ursidla	0.90	0.90	1.29	44.35	Point Lowly.....	0.55	0.55	0.45	12.21
Clarendon	0.77	0.77	1.12	33.67	Cummins	0.19	0.19	—	—
Morphett Vale ...	0.32	0.32	0.81	23.32	Arno Bay	0.10	0.10	0.12	—
Noarlunga	0.18	0.18	0.62	20.28	YORKE'S PENINSULA.				
Willunga	0.08	0.08	0.75	25.98	Wallaroo.....	0.10	0.10	0.56	14.06
Aldinga	0.08	0.08	0.54	20.34	Kadina	0.02	0.02	0.51	16.88
Normanville	0.02	0.02	0.56	20.65	Moonta	0.05	0.05	0.53	16.22
Yankalilla	0.04	0.04	0.51	22.78	Green's Plains	—	—	0.50	15.73
Cape Jervis	—	—	0.41	16.34	Maitland	0.19	0.19	0.59	20.08
Mount Pleasant ..	0.29	0.29	0.82	26.87	Androssan	0.10	0.10	0.61	13.86
Birdwood	0.35	0.35	1.11	29.38	Port Victoria	0.18	0.18	0.45	15.21
Gumeracha	0.86	0.86	1.08	33.90	Curramulka	0.18	0.18	0.58	18.50
Tweedvale	0.59	0.59	1.01	35.38	Minlaton	0.23	0.23	0.48	17.41
Woodside	0.67	0.67	0.97	31.87	Stansbury	0.22	0.22	0.60	17.06
Ambleside	1.01	1.01	1.05	35.45	Warooka	0.08	0.08	0.43	17.71
Nairne	0.42	0.42	0.96	28.83	Yorketown	0.09	0.09	0.48	17.47
Mount Barker ...	0.76	0.76	1.02	30.93	Edithburgh	0.03	0.03	0.50	16.48
Echunga	1.02	1.02	1.05	32.83	SOUTH AND SOUTH-EAST.				
Macclesfield	0.61	0.61	0.87	30.72	Cape Borda	0.12	0.12	0.65	25.09
Meadows	0.40	0.40	1.01	35.52	Kingscote	0.33	0.33	0.43	18.95
Strathalbyn	0.11	0.11	0.70	19.28	Penneshaw	0.17	0.17	0.61	21.34
Myponga	0.53	0.53	—	—	Cape Willoughby..	—	—	0.71	19.69
Millbrook Reservr.	0.76	0.76	—	—	Victor Harbor	0.12	0.12	0.74	22.18
MURRAY FLATS AND VALLEY.					Port Elliot	0.10	0.10	0.68	20.33
Wellington	0.31	0.31	0.78	15.01	Goolwa	0.10	0.10	0.67	17.93
Milang	0.32	0.32	0.66	16.08	Pinnaroo	0.32	0.32	0.35	16.74
Langhorne's Brdg ..	0.06	0.06	0.45	15.27	Parilla	0.17	0.17	—	—
Tallem Bend	0.56	0.56	0.34	—	Lameroo	0.24	0.24	0.52	16.65
Murray Bridge	0.18	0.18	0.61	14.32	Parrakie	0.38	0.38	0.37	—
Callington	0.38	0.38	0.72	15.65	Geranium	0.14	0.14	0.43	—
Mannum	0.04	0.04	0.52	11.67	Peake	0.26	0.26	0.47	—
Palmer	0.07	0.07	0.43	15.60	Cooke's Plains	0.26	0.26	0.55	14.74
Sedan	0.05	0.05	0.53	11.92	Meningie	0.41	0.41	0.66	—
Blanchetown	—	—	0.55	—	Coomandook	0.19	0.19	0.52	16.60
Eudunda	0.03	0.03	0.75	17.33	Coonalpyn	0.81	0.81	0.71	17.49
Sutherlands	0.04	0.04	0.33	10.71	Tintinara	0.49	0.49	0.48	18.78
Morgan	0.09	0.09	0.49	10.66	Keith	0.47	0.47	0.34	—
Overland Corner ..	—	—	0.51	—	Bordertown	0.48	0.48	0.77	19.76
Renmark	0.38	0.38	0.45	11.42	Wolseley	0.72	0.72	0.61	17.76
Loxton	0.15	0.15	0.32	10.93	Frances	0.53	0.53	0.72	20.74
Swan Reach	—	—	0.37	—	Naracoorte	0.36	0.36	0.33	22.04
Waikerie	0.08	0.08	0.23	—	Penola	0.55	0.55	1.07	26.71
WEST OF SPENCER'S GULF.					Lucindale	0.43	0.43	0.73	23.36
Eucla	0.15	0.15	0.63	10.13	Kingston	0.29	0.29	0.74	24.71
White Well	—	—	0.47	9.67	Robe	0.45	0.45	0.78	24.6
Fowler's Bay ...	0.01	0.01	0.40	12.13	Beachport	0.38	0.38	0.92	20.2
Penong	0.02	0.02	0.29	11.91	Millicent	0.37	0.37	1.01	32.0
Murat Bay	0.10	0.10	0.14	—	Mount Gambier ..	0.29	0.29	1.44	32.0
Smoky Bay	0.05	0.05	—	—	C. Nrthumberland	—	—	0.87	—
Streaky Bay	—	—	0.44	15.31	Kalangadoo	0.51	0.51	—	—

AGRICULTURAL BUREAU REPORTS.

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		Feb.	Mar.			Feb.	Mar.
Amyton	*	—	—	Burelia	601	—	—
Angaston	*	—	—	Forster	*	—	—
Appila-Yarrowie	*	—	—	Frances	*	—	—
Arden Vale & Wyacca	*	—	—	Freeling	*	21	28
Arthurton	*	—	—	Gawler River	*	25	25
Ashbourne	605	25	25	Georgetown	*	—	—
Balaklava	*	—	—	Geranium	*	23	30
Beaufort	*	—	—	Gladstone	*	—	—
Beetaloo Valley	*	—	—	Glencoe	*	—	—
Belalie North	*	23	23	Glencoe	*	—	—
Berri	†	27	27	Goode	*	—	—
Blackheath	606	23	23	Green Patch	*	—	—
Blackwood	606	18	18	Gumeracha	*	25	21
Blyth	*	—	—	Halidon	*	—	—
Bookpurnong East	*	—	—	Hartley	*	—	—
Booleroo Centre	*	22	22	Hawker	*	26	26
Borrika	*	—	—	Hilltown	*	—	—
Bowhill	*	—	—	Hookina	*	26	26
Brentwood	*	28	28	Inman Valley	609	—	—
Brinkley	*	—	—	Ironbank	*	—	—
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Burra	*	—	—	Kadina	*	—	—
Bute	*	—	—	Kalangadoo	*	9	9
Butler	*	—	—	Kanmantoo	613	23	23
Caltowie	*	—	—	Keith	*	—	—
Canowie Belt	*	—	—	Ki Ki	*	—	—
Carrieton	*	—	—	Kingscote	*	—	—
Carrow	*	—	—	Kingston-on-Murray	*	—	—
Cherry Gardens	608-13	26	26	Kongorong	*	19	26
Clanfield	*	—	—	Koonibba	*	19	26
Clare	601	—	—	Koppio	*	5	5
Clarendon	608	—	—	Kybybolite	613	21	21
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Colton	*	—	—	Laura	*	22	22
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Coomooroo	*	—	—	Lenswood and Forest Range	*	—	—
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Coomawarra	*	—	—	Longwood	609	—	—
Coorabie	*	—	—	Lexton	*	—	—
Cradook	*	—	—	Lucindale	*	—	—
Crystal Brook	*	—	—	Lyndoch	*	—	—
Cummins	*	23	30	MacGillivray	*	—	—
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Davenport	*	—	—	Mallala	*	11	11
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		Feb.	Mar.			Feb.	Mar.
Meribah	*	—	—	Port Germein	*	—	—
Milang	*	9	9	Port Pirie	*	23	23
Millicent	*	12	12	Quorn	*	23	23
Miltalie	*	23	23	Rameo	*	—	—
Mindarie	*	4	4	Redhill	*	—	—
Minlaton	*	22	22	Renmark	*	—	—
Minnipa	*	—	—	Riverton	*	—	—
Mintaro	*	23	23	Riverton (Ladies) ..	*	—	—
Mitchell	*	—	—	Roberts and Verran ..	*	—	—
Monarto South	*	—	—	Rosedale	*	—	—
Moonta	603	—	—	Rosy Pine	*	—	—
Moorlands	*	—	—	Saddleworth	602	23	23
Morchard	601	23	23	Salisbury	*	—	—
Morgan	605	23	—	Salt Creek	*	—	—
Morphett Vale	*	23	—	Sandalwood	616	—	—
Mount Barker	610	20	27	Sherlock	*	—	—
Mount Bryan	*	—	—	Spalding	*	—	—
Mount Bryan East ..	*	—	—	Stockport	*	—	—
Mount Compass	*	—	—	Strathalbyn	*	26	26
Mount Gambier	613-14	9	9	Sutherlandbyn	*	—	—
Mount Hope	604	23	23	Talia	604	9	9
Mount Pleasant	*	—	—	Tantanoola	615	3	2
Mount Remarkable ..	601	—	—	Tarcowie	*	26	26
Mundalla	614	20	27	Tatiara	*	2	2
Mundoora	*	—	—	Tintinnarra	*	—	—
Murray Bridge	610	—	—	Two Wells	*	—	—
Mypolonga	*	—	—	Uraidla and Summert'n	*	—	4
Myponga	*	—	—	Waikerie	*	22	—
Myra	*	—	—	Wareowie	*	—	—
Nantawarra	*	—	—	Warrow	*	—	—
Naracoorte	615	—	—	Watervale	*	—	—
Narridy	*	—	—	Wepowie	*	23	23
Narrung	*	—	—	Whyte-Yarcowie	*	20	18
Netherton	*	—	—	Wilkawatt	*	—	—
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Parilla Well	*	—	—	Woodside	*	—	—
Parrakie	*	—	—	Wynarka	*	—	—
Paskeville	*	—	—	Yabmana	*	—	—
Penola	*	—	—	Yacka	*	—	—
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Petina	*	—	—	Yallunda	*	—	—
Pine Forest	*	—	—	Yaninee	*	—	—
Pinnaroo	*	—	—	Yeelanna	604	—	—
Pompoota	*	—	—	Yongala Vale	*	22	22
Port Broughton	*	—	—	Yorketown	*	—	—
Port Elliot	611	16	16				

* No report received during the month of January.

† Held over until next month.

THE AGRICULTURAL BUREAU.

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch.

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

REPORTS OF BUREAU MEETINGS.

UPPER-NORTH DISTRICT.

(PETERSBURG AND NORTHWARD.)

MORCHARD (Average annual rainfall, 11in. to 12in.).

December 29th.—Present: 12 members.

ODDS AND ENDS.—The Hon. Secretary (Mr. H. G. Kupke), in a short paper dealing with this question, enumerated a number of points that every farmer should observe, such as the wisdom of providing a good supply of fodder for the stock, overhauling each implement before commencing operations in the field, and when finished work putting it under cover. Fences and gates, he suggested, should be kept in good order, as untidy fences gave the whole farm a bad appearance. Particular attention should be paid to see that a good supply of water was provided, otherwise harvesting operations would be hindered. He was of the opinion that much of the disease and sickness connected with the stock could be avoided if the stables and stock yards, &c., were kept clean. On wet days repairs to machinery, harness, and other odd jobs about the homestead could be affected. He also thought it would be a good plan to plant vegetables during winter months. In concluding, he thought every farmer should have as his motto, "A place for everything, and everything in its place."

EURELIA, December 20th.—The question of "Noxious Weeds" was discussed by the meeting.

MOUNT REMARKABLE, December 19th.—A paper written by the Director of Agriculture (Professor A. J. Perkins), dealing with "Salts in Soils," was read by a member.

LOWER-NORTH DISTRICT.

(ADELAIDE TO FARRELL'S FLAT)

CLARE (Average annual rainfall, 24.30in.).

January 25th.—Present: 17 members.

Mr. Matthews delivered a short paper dealing with "Methods Adopted for the Rotation of Crops in England." Careful attention was paid to the application of manures and the tillage of the soil. Wheat, mangolds, and potatoes were the principal crops grown. Sheep were used to a large extent to feed off the crops and keep the land clean. He also made reference to the cider-making industry as practised in Devonshire.

LONE PINE.

January 22nd.—Present: 19 members and five visitors.

MAKING THE FARM PAY.—"To obtain good results from farming," said Mr. W. W. Schmaal, jun., in a paper under this heading, "good management and careful attention were required. A farm comprising 300 to 400 acres should have 150 acres under crop, 150 acres fallow, and the balance grass land for stock," the paper continued. "To secure good crops the first thing is to have good fallow. Fallowing should be started as soon as possible. Sheep should be kept, as they help to keep the fallow in good order, and at the same time add fertility to the soil, and there is a fair profit to be made from the breeding lambs. It is not wise to rely solely on wheat-growing, but if one kept other sidelines there would be something to rely on should the wheat season prove a failure. Crops that would yield two tons and over would pay better if they were cut for hay than if left for grain. A few good cows, if well looked after, would help a great deal in the upkeep of a farm, as there would always be a fair amount of separated milk for the pigs, besides the cream. The calves should all be marketed as soon as ready, and not reared, except in cases of heifer calves from specially good milkers, because the feed the calves consumed would keep a couple of extra cows. To make a profit which is worth having from fowls about 200 birds should be kept. It should be the aim of every farmer to breed enough horses for the successful working of his farm. It would pay every farmer to sow about 10 acres barley or oats for fodder every year, as by so doing he could save a fair amount of hay." In the course of the discussion which resulted, the writer of the paper mentioned that on an area as mentioned above 200 sheep and five or six cows could be kept.

SADDLEWORTH (Average annual rainfall, 19.69in.).

September 1st.—Present: 15 members.

A paper dealing with the bulk handling of wheat was read and discussed. On September 29th a meeting was held, when the report of the delegates to the Annual Congress was received. The papers dealing with "Noxious Weeds and 'Fox Destruction'" were discussed. Mr. C. Townsend contributed a paper on "Hay-making" at the meeting held on October 27th. He said before commencing hay cutting one should thoroughly overhaul the binder and have the knives well sharpened. The crop should be cut when the grain was fully formed and in the milky stage. Large sheaves should be cut because that entailed less handling and would not use up so much binder twine. When cutting clean wheat crops, such as bearded varieties, Tarragon and Baroota Wonder, the band should be tied fairly near the butt, otherwise the hay would work out of the bands. Other wheats, barley, and oats could be tied about the middle of the sheaves. If the crop was tall he advocated making large round stooks directly after it was cut; but if on the short and green side smaller stooks would be better. The stacks should be built up and the middle well filled, which should be 4ft. or 5ft. higher than the sides if the stack was more than 7yds. wide, as that would give the eaves a good slope. The middle of the stack, if built with the heads outwards, would pack together tightly, and also give less opportunity for mice doing damage. The roof could be built with the heads facing outwards in order to prevent heavy rains entering before it was thatched.

CARE OF FARM IMPLEMENTS.—Under this heading a paper was also contributed by Mr. P. Manning, in the course of which he said the large amount of capital required to purchase the necessary implements and machines under present conditions made it necessary that one should take the very best care of them to ensure longer efficient service. That could be done by providing storage when not in use to keep them clean, and effect the necessary repairs before taking the machine into the field. He had found it a good plan to put all the implements in gear when being stored, as that relaxed the pressure on any spring coils, &c. The feed working parts of the drill, if given a coat of enamel paint, would be found to be very easy to keep clean. Lastly, he urged upon members the need for keeping all parts well lubricated.

On November 24th a paper entitled "Harvesting the Crop" was contributed by Mr. D. Fraser. The complete harvester, he said, was a machine that would save one much time, labor, and money. He suggested a plan whereby farmers could co-operate and purchase a threshing machine or complete header. Many of the crops could be saved, and that would enable them to build a stack of clean headed straw that would prove a valuable asset in winter months when other feed was scarce. A paper on "Wheat Selection" was also read by the Hon. Secretary (Mr. F. Coleman).

YORKE PENINSULA DISTRICT.

(TO BUTE)

DOWLINGVILLE (Average annual rainfall, 13in. to 14in.).

November 29th.—Present: nine members and one visitor.

WEIGHING WHEAT IN BULK.—Mr. J. A. Phelps, in a short paper dealing with this question, thought wheat could be weighed in bulk provided weighbridges were installed at each railway station that received up to 60,000 bags of wheat. Each load of wheat weighed could be charged a small sum, and that would soon pay for the bridge, and keep it in good order. If the bridges were installed they could be controlled by the district council. If a man was paid £5 per week to sample and weigh the wheat, for, say, 16 weeks, a considerable saving would be effected.

MOONTA (Average annual rainfall, 15.22in.).

December 1st.—Present: 16 members and two visitors.

POULTRY ON THE FARM.—The question of poultry on the farm was dealt with in a paper by Mr. T. H. Hooper. The following is taken therefrom:—"On the average farm at least the fowls are the most neglected part of the business. I have seen a farmer carefully select his other stock for breeding, and say that it was necessary to be careful in mating to get the best results, let his fowls mate anyhow, and not bother his head to know if he was breeding from the best or otherwise. During the last few years some of the farmers are beginning to realise the possibility that lies in this branch of their business. In America they are running it for all it is worth, and I believe it is worth more to-day than the wheat production. The Government are now taking up the matter of finding a market, and if the eggs are collected daily and the male birds are kept away from the hens that are not required for breeding, and only infertile eggs marketed, it will be possible to export our surplus eggs to England in pulp and cool store to carry us through our slack seasons. The reason that the male birds should be kept away from the hens is that if an egg is fertile and kept at a temperature of 100deg. for 12 hours, then stored for two or three weeks, it will turn black and become unfit for use; hence the danger from broody hens. It is necessary in the first place, if a farmer intends to improve his stock, to erect two or three breeding yards. Information on this point can be obtained from the Poultry Expert. Then secure some good breeding stock from one of our reliable poultry keepers, and having hatched and reared sufficient chickens, kill or market all the old stock on the farm. I give preference to the White Leghorn for laying purposes. As these hens are non-sitters it will be necessary to keep a heavy breed for hatching, that is if an incubator is not kept. I feel sure it would pay any farmer to have an incubator and brooder; the chickens can then be hatched in the proper season, which is August and September. As a rule it is almost impossible to get sufficient broody hens so early, and consequently the chickens are hatched out of season, they do not mature properly or lay as well as when hatched in season. Some people pin their faith in the crossbred fowl. That would not be so bad if they were to refrain from using them for breeding purposes. Having tested them myself, I find the first cross a fairly good layer, but the stock reared from them is hardly worth their feed. Then again it does not pay to keep a lot of old hens; two years is quite old enough for laying purposes. Sufficient young stock should be hatched each year.

to replace the old ones. If this is done it will mean quite a third more eggs for the same amount of feed given. The housing accommodation is also sadly neglected. In most cases the birds sleep in trees or old sheds which are full of vermin. If horses are turned out in an open yard during the winter months they require more feed, and will not do so much work as those stabled and well cared for. It is only natural to expect the same from our poultry. Two parasites we have to contend with in rearing poultry are worms and tick. They are responsible for nearly all the ailments in fowls. In conclusion, I feel sure that if our feathered friend was only given a little more time and thought it would prove one of the best paying branches of our business and a valuable asset to the country.

WESTERN DISTRICT.

YEELANNA.

December 29th.—Present: 15 members and two visitors.

The usual monthly meeting of the Branch took the form of a "Question Box." In reply to a query as to the best quantity of super. to use when sowing wheat, Mr. J. K. Dunn expressed the view that manures used at the rate of one bag to three acres would be found most economical. Members were of the opinion that "cocky chaff" was of very little value as a food for stock. In discussing the question as to the age at which to break in horses members generally agreed that the age of between two and three years was best, but the animals should only be given very light work.

MOUNT HOPE, December 29th.—The meeting took the form of a discussion on several questions of local interest. Mr. R. Myers suggested that the Government should be requested to establish a station for the purpose of demonstrating the value of the mallee on the southern part of Eyre's Peninsula from the point of view of fruit, olive, and wattle production. These districts were settled, he said, but people were leaving their holdings as they were unable to support their families by wheat growing. The difficulty was, members suggested, that the landholders had exhausted their capital in their endeavor to grow wheat; they had not the means to start other doubtful industries; although they felt confident that once established, they would turn out all right.

TALIA, January 9th.—The first meeting of the Talia Branch was held at the residence of Mr. A. G. Day. The Hon. Secretary (Mr. W. J. McBeath) read several extracts from the "Handbook of the Agricultural Bureau." Officers were elected.

EASTERN DISTRICT.

(EAST OF MOUNT LOFTY RANGES.)

NUNKERI AND YURGO (formerly McNamara Bore).

January 6th.—Present: 11 members and two visitors.

GARDENING ON THE FARM.—"For one excuse or another, such as they cannot spare the time, or don't care about the work, too many farmers neglect the garden," said Mr. D. Bicknell, in the course of a paper dealing with farm gardening. Those were poor excuses, he continued, as a few days spent in the garden would not be missed, and the benefits would be much appreciated. A small area well kept and worked would return more profit for the labor. Onions, swedes, turnips, silver

beet, radish, carrots, and peas could be grown without irrigation if they were planted in April, whilst such crops as cabbage, rhubarb, tomatoes, red beet, and celery needed to be planted where they could be irrigated. A mulch of cocky chaff would save a considerable quantity of water, and an occasional hoeing would be found beneficial. A single-furrow plough was a very useful implement in a garden of any size. Before the land was ploughed it should be well dressed with stable manure, and when being planted a light dressing of super. should be added. A primal essential was to securely fence the garden against stock of all kinds.

WOLOWA.

October 24th.—Present: 12 members and 40 visitors.

VISIT TO VEITCH EXPERIMENTAL FARM.—The monthly meeting was held at the Veitch Experimental Farm. Members were shown over the crops and plots by the manager of the farm, Mr. L. Smith. A working trial of farming implements was also conducted, and members took the opportunity of inspecting the various machines. In the evening the Poultry Expert (Mr. D. F. Laurie) delivered an address on "Poultry and their Ailments."

MORGAN, January 26th.—A discussion took place with regard to the use of lime as a fertilizer.

SOUTH AND HILLS DISTRICT.

ASHBOURNE.

December 31st.—Present: 12 members and two visitors.

The first meeting of the Ashbourne Branch was held in the local schoolroom on Monday, December 31st, 1917.

POTATO-GROWING.—Taking this topic as a subject for his paper, Mr. V. Payne said potato-growing could be divided into two divisions, viz., the spring crop and the summer crop. So far as South Australia was concerned the potato-growing industry was practically confined to the following centres:—The Hills districts, the Adelaide plains, and the South-East. For the production of that crop four or five acres of the best land should be selected on a site that would allow all floodwaters to drain off quickly. That point was most important, because if the land was very wet or sodden for any length of time it would cause rot to set in, which would ruin the crop. The land should be well ploughed to a depth of about 6in. to 8in., harrowed thoroughly, and rolled. He strongly pointed out to members that it was very injurious to the crop to work the land when it was in a wet condition. The land should be left for a month or six weeks to allow all vegetation to decay, when it should, if possible, be ploughed again in the opposite direction to that of the first working, and then harrowed and rolled down to a fine tilth. He considered it a good plan to drill in about 2cwt. to 3cwt. of manure on the prepared land before planting, and place the remaining 4cwt. to 6cwt. in the furrow with the seed. Either Bismark, Pinkeye, or Redskin could be selected as good seed potatoes for the spring crop. Seed should only be taken from roots that had produced fairly large tubers, well shaped, free from disease, and not of a weedy variety. Unless a grower had some idea of the life and nature of the potatoes selected for seed, mistakes would happen with that part of the industry. Experience had shown him that one could not do better than procure the seed from Victoria. Care should be taken that the shoots were not too long at the time of planting, because every shoot that was broken off at the time of planting lessened the vitality of the potato. Large potatoes should be cut lengthways, leaving not less than three eyes on each set. Farm manure, when procurable, was the best class of fertilizer to use. Where possible a thick dressing should be spread over the land and ploughed in just before the potatoes

were planted. Should it be necessary an extra pouthing could be given to work the manure thoroughly into the soil. Bonedust and potato manure were both reliable fertilizers, and should be applied at the rate of about 6cwt. to 10cwt. to the acre. He advised the sowing of a crop of peas or beans after the crop of potatoes. Potatoes should be planted three furrows apart, or about 2ft. 6in. between the rows, and the sets 15in. apart in the row and about 4in. deep. Extra care should be taken that the sets were not put on the bottom of the furrow. If a margin of 2in. or 3in. was left the young tubers would have loose earth in which to form. As the young shoots would not show through for a month the land should be harrowed. Not only would that kill any young weeds, but it would break the crust of the land and allow the young plant to obtain air and sunlight, which caused a strong and vigorous growth, and when the rows could be traced the cultivator should be used with the tines set in such a way that the young tubers would not be damaged. Potatoes should be left in the earth until the skins had well set before they were dug. He thought a great deal of improvement could take place in regard to the bagging of the product; it was not an uncommon sight to see sacks badly filled, poor bags used, and badly sewn. Such a practice had a tendency to give the grower a bad name in the market.

PIG-FATTENING.—Mr. H. Meyer, in a paper on this question, said to obtain the best results one should study the following points:—(1) Condition of sties, (2) class of pig required by the curers, (3) the cheapest and quickest breed to fatten, and (4) regularity of feeding and the choice of food. If it could be managed summer and winter sties should be erected. For the summer months the pigs would thrive best in a sty that could be kept cool and well hosed out. A gable thatched roof, with plenty of ventilation, and brick or cement floor were essential. For the wet, cold weather warmth and cleanliness should be considered. Pigs preferred by the curers were those that would weigh, when dressed, from 100lbs. to 120lbs. An Essex sow mated with a Berkshire boar was a profitable pig to keep for fattening. Regularity of feeding was a point that should not be overlooked. During the cold weather a warm drink of pollard and water or skim milk if procurable should be given with dry crushed corn in a separate trough. It was an established view among successful pig breeders that dry feeding gave better results than wet feeding, but all corn should be crushed or a certain portion would pass through the pigs, and thus be wasted. A change of food would be found beneficial, and when the pigs were ready for killing no time should be lost in dispatching them to market.

BLACKHEATH.

December 22nd.—Present: nine members.

ADVANTAGES OF THE AGRICULTURAL BUREAU.—Mr. H. G. Pym, in a paper under this heading, said the advantages to be derived from becoming a member of the Agricultural Bureau were many and varied. The Bureau was a medium through which much sound and practical knowledge could be obtained. The young man starting farming or any other rural industry could not do better than join a Branch of the Bureau, where he would meet and be able to converse with men of much wider experience than himself. The expert officers of the Department were always pleased to answer any questions and give information on any of the many subjects that tended towards the successful working of the farm. Another point that should not be overlooked was that all members were entitled to a copy of the *Journal of Agriculture*, issued by the Department. The reports of the cereal experiments conducted from time to time under the auspices of the Department were published therein, besides the doings of the Branches of the Bureau situated all over the State.

BLACKWOOD (Average annual rainfall, 27in. to 29in.).

December 17th.—Present: 12 members.

SOME THOUGHTS ON AGRICULTURE.—In presenting a paper under this title Mr. L. Porter directed attention to the different points of view of the city man and the tiller of the soil in regard to agriculture; with the former the aesthetic pre-

dominating, and with the latter principally the utilitarian. "Of whatever sort it might be," the paper continued, "the process of securing the crop is basically the same, namely, to destroy the native growth which may be occupying the land, turn in what we term weeds, and sow seeds or plant trees which we estimate will produce a bigger and better crop than the growth which was previously on the land. The actual sowing may be accomplished in different ways—several methods might be applied in the treatment of the soil, in assisting the growing crop, and in the ultimate reaping, but one might assert that it is in few cases that these operations are carried out along well-defined scientific lines. Although science is applied in certain agricultural practices in Australia, it is safe to say that every cultivator of the soil is not a scientist. The same general remark applies, of course, to every description of workman, but if we take any of the mechanical trades such as engineering, or the professions such as surveying, chemistry, or medicine, we see that a first-class man proceeds about his work with certain well-established scientific principles in view. In surveying, for instance, a man cannot go outside these principles without making a mistake and spoiling his work. In the agricultural realm, apparently, a man must be rather guided by experience, and there will be some to argue that experience is the best teacher, and that a man should work out his own local problems. But must this always be so? If a medical man went along these lines with every patient who presented a different case for his skill, we could imagine that the profession would soon be in disrepute. The only difference between the two is that the failures of the farmer and gardener do not result in such catastrophes as would happen in the former case, and therefore they are only lightly regarded. In order to promote the success of agriculture we cannot work upon the basis that the value of the life of a plant is only relatively small in comparison with that of a human being, and that therefore the concern of the gardener to save the plant or ensure its health should be but in proportion to that value. Can he haphazardly cultivate a plot and receive indifferent results, when about an equal time spent in doing it with definite principles in view would give an increased harvest. I know that with agriculturists, as with men in other professions, the human element counts. There are degrees in the qualifications of the workmen; there are men with energy and industry without the requisite knowledge to do the work well; and there are men with knowledge who fail to turn it to account. The only fair way is to strike an average, and it will no doubt be conceded that the average man does not know all the scientific reasons which prompt the various operations. In the matter of spraying for codlin moth, for instance, most understand the subject because it is most necessary to know the why and wherefore in order to carry it out effectively, but have similar pains been taken in coming to understand likewise all the other operations which are the regular routine of the orchardist, wheat-grower, or market gardener? The anxiety of the true physician is in regard to the life of his patient, and the anxiety of the agriculturist should similarly be in regard to the life of his plant. The question is, ought the farmer to be more careless in his work than the doctor? Admitting that human life is of more moment than plant life, ought this consideration to induce the one operator to exercise less care than the other, always providing, of course, that the agriculturist, like the doctor, pursues his calling, not simply for what he can get out of it but with a sense of his duty to the State, and with a love for the work. Does the farmer, in breaking up his ground, have the same regard to capillary attraction as the surgeon would of the circulatory system in operating on a patient? These questions obviously aim at the ideal in respect of agricultural science. May be some will say that agricultural science has not advanced to the same degree as the science of medicine and surgery, and the reason is traceable to the fact as before stated that more value is placed on the one than the other. No doubt the day will come when the art of providing nourishment for the living human organism will be elevated to somewhere near the same plane as the art of healing that organism of disease, and just as doctors study and train for a period of years before they practice their art, so will it be deemed necessary for the intended agriculturist to study and train before he launches on his own account. Roseworthy College will only be a type of many colleges throughout the State, and a parent will no more think of putting his son to farming without passing through a college than he would expect him to become a doctor before taking his degree. It may be held that this is a Utopian idea, but circumstances are very likely to render it a reality in the years ahead. It should be a goal towards which all agricultural reforms should aim. The

advance represented by the almost universal establishment of high and technical schools can be considered as a sign of the times. Agriculturists, however, should remember that all science has been promoted chiefly by men engaged in the particular branch of study, and it is certain that agriculture cannot look to others than those engaged therein for the principal additions to its stock of scientific knowledge, although chemistry, engineering, and other sciences can materially contribute thereto. It is obvious that every agriculturist cannot conduct his own laboratory investigations, and it is the duty of the State to see that the progress of the greatest industry of the Commonwealth is not hindered through lack of facilities for acquiring every detail of knowledge which would enable production to proceed more economically, and with a greater certainty of results. But the request for any action in this direction must assuredly come from those who see its necessity. Agriculturists, in common with men in every department of life, will have to solve their own post-war problems. Those which will immediately confront him will to a large extent depend upon the condition in which the Empire finds itself at the conclusion of hostilities. Questions which suggest themselves are, 'Will the release of shipping from military and naval work provide means for regaining our erstwhile markets and extending them? If there is a shortage of food throughout the world, the first consideration will be the transportation of all we can supply. If the demand for fruit is greater than we expect, how are we going to meet the contingency?' Is more intensive cultivation going to supply the answer? It is not too soon for the producer to bestir himself in these matters, for failure to rise to the occasion as soon as it presents itself may mean injury to our trade prospects.'

CHERRY GARDENS (Average annual rainfall, 35.03.).

January 22nd.—Present: 14 members.

OBSERVATIONS.—As usual the initial few minutes of the meeting were devoted to the discussion of various topical points brought under the notice of members during the month. The Chairman (Mr. C. Ricks) had observed that the late apples on his holding, and particularly the Rome Beauty variety, were badly attacked with *Fusicladium*. The development of the disease was attributed to the damp prevailing at the time of the early growth. Mr. H. Jacobs remarked that his late potatoes had produced an abundance of flowers and plenty of roots, but a light crop of tubers developed. This was generally attributed to the dry weather. The plum crop in the district was generally light.

PIGS AND POTATOES.—Mr. J. H. R. Ferris, in the course of a paper entitled 'Potatoes as Food for Pigs,' stated that that crop formed a large percentage of the food given to pigs in England. The up-to-date method of preparing the food, he said, was to pulp the raw tubers, either feeding them thus pulped or boiling. For fattening the principal food was barley meal, pollard being seldom used, except in the early stages. In Wiltshire large factories purchased pigs according to quality; the most favored being the animal of from 150lbs. to 180lbs. The factories also issued printed directions as to methods of feeding, and one factory had a boar available for service. His experience was that under conditions prevailing in England pigs fed on boiled potatoes and barley meal produced the best bacon. A very interesting discussion followed. Mr. Ferris stated that first-class results would be obtained by feeding pigs on barley meal mixed with potatoes, but he was doubtful if, in our hot weather, it would be wise to feed barley, as it was very heating. Mr. Henry Jacobs recommended pollard mixed with potatoes, but he would use potatoes as the main food for fattening. Mr. Henry Strange mentioned milk as very helpful when mixed with potatoes or other food.

CLARENDON (Average annual rainfall, 33.67in.).

December 17th.—Present: 12 members.

PRUNING.—Mr. E. Dunmill read a paper entitled 'A Few Notes on Pruning.' After referring to the need for having good tools well kept, he stated that the first pruning the tree should be cut back to one stem, 18in. or 20in. high. The more vigorously the tree grew the less vigorously should it be pruned, and vice versa. Shoots cut back to 6in. on some trees would not be too short; whilst on others 6ft. would not be too long. The peach required most attention in so far as

pruning was concerned; at least half the tree should be cut out each year; light cropping trees less, heavy croppers more. Apricots required much the same treatment. Vines for the first year or two should be restricted to one main shoot each year. When the vine began to throw a good shoot 8ft. or so in length its training could be commenced. If for a "gooseberry bush," it should be caused to send out three main arms 10in. or 1ft. from the ground, and then worked on the same principle as the fruit-trees. For a trellis, the vine should be trained to one main arm, and that should be extended each year according to the strength of the vine, the leading shoot of the preceding year's growth being shortened back to good stout wood, and all other growth being cut away except where rods and spurs were wanted. On a spur pruned vine spurs should be spaced 12in. to 18in. apart, and where there were rods and spurs the distances should be from 2ft. to 4in. He found it profitable to err on the side of hard pruning, because better growth and fruit resulted.

CYGNET RIVER.

January 24th.—Present: nine members.

HOMESTEAD MEETING.—Mr. J. J. Osterstock contributed a short paper in which he dealt with the advantages of the homestead meeting. In the course of his remarks he emphasized the effect on the social side of rural life of a gathering at a homestead. He suggested a quarterly meeting of that nature. Mr. Noske reported on the yields of crops sown by him at different times during the season just closed. In each case 50lbs. of barley and 112lbs. of super. were sown. The crop seeded in June yielded 10bush., that sown in August, 32bush., and that put in on October 13, 18bush.

INMAN VALLEY (Average annual rainfall, 26in. to 27in.).

January 24th.—Present: six members.

NOXIOUS WEEDS.—A paper written by Pte. H. Lush was read by the Hon. Secretary. In the course of the paper it was mentioned that where blackberries were growing to any extent they became a pest, as weak sheep were likely to become caught in the bushes. The best means of destroying them was to burn them as soon as they became dry every year. Briars, which were more noxious, because they spread rapidly, should be cut and grubbed. Thistles and stinkwort were also troublesome in that district. The best means of ridding the land of the latter pest was to continuously hand pull the plants before they seeded. Prickly pears, like blackberries, afforded harbors for rabbits. Furze was best grubbed. Bracken fern was troublesome, and as it generally grew on hilly, stony country, little was done in the direction of clearing it out. He advised attacking weed pests as soon as they made their appearance. Members discussed the question at length. It was agreed that many declared noxious weeds were of value as feed, and did little or no harm. On the other hand there were those that had no feed value and smothered useful herbage.

LONGWOOD (Average annual rainfall, 37in. to 38in.).

December 29th.—Present: 10 members and two visitors.

FRENCH BEANS AND INSECT PESTS.—Mr. John Roebuck detailed to the meeting the result of his tests in treating bean seeds with kerosine and turpentine as a means of protecting the beans against the ravages of slugs and other insect pests which destroyed the beans before they came up. One bed was sown with beans which had previously been dipped in kerosine; the germination was about 4 per cent.; untreated beans in the same bed showed a result of about 60 per cent. germination. In another bed he planted untreated seed, and seed shaken through kerosine, and also some shaken through turpentine. Of the first 90 per cent. germinated, but the kerosine and turpentine treated seed only showed a result of about 40 per cent.

WOOLLY BLIGHT.—Mr. Risely reported having applied burnt oil from a motor engine and kerosine to some large, old apple trees which had been affected with woolly blight. The treatment had proved effective. The Hon. Secretary (Mr. J. R. Cotes) then read a paper dealing with the feeding of livestock. The general opinion of members was that to profitably grow poultry, pigs, or cows it was necessary to grow most of the food on the spot.

MOUNT BARKER (Average annual rainfall, 30.93in.)

November 28th.—Present: 45 members and one visitor.

FARM PESTS AND THEIR DESTRUCTION.—Mr. H. Jones, in a paper under this title, first dealt with the question of noxious weeds. A good plan for the eradication of these pests, he said, was to work backwards and forwards across the paddocks, using the furrows, when visible, as a guide, and grub each plant. Few weeds, if any, would be missed if that method was carried out. That district was not troubled to any great extent by either rats or mice. When stacking grain some poisoned wheat mixed with chaff in small bags and placed among the grain would destroy a great many mice. A few holes cut in the bag containing the poisoned wheat would add to the results. Every opportunity should be taken to kill the mice and rats. A small dog would be of great assistance if kept in the paddock when hay was being carted. In view of the large number of rats and mice killed by snakes and hawks, he was of the opinion that it was not wise to undertake the wholesale destruction of these allies of the farmer. Sparrows did a large amount of damage in almost every agricultural and horticultural district, yet practically no steps were taken to exterminate them. The birds could be destroyed in fair numbers if poisoned wheat was distributed after the drill during seeding time. Points to be avoided to minimise the danger of weevil were not to reap the grain until it was properly ripe, and not to store it in damp bags. Storing on a damp floor in the shed was very often the cause of weevil developing in the grain. Leaf destroying insects could be very effectively dealt with by dusting the plants with lime four parts and sulphur one part. When planting out it was advisable to dip the young plants into a solution of tobacco water. Soot from a chimney, if dissolved in water to about the color of strong tea, was also a good plant wash. The best time to spray trees for codlin moth was just when the petals were falling. The bandages on the trunks of the trees should also be carefully examined, as they provided a very good harbor for caterpillars and grubs. In concluding the speaker urged members to co-operate and endeavor to destroy all pests of the farmer. Mr. H. W. Andrew (Botanical Assistant and Quarantine Officer for Plants) delivered an address on "Proclaimed Noxious Weeds."

MURRAY BRIDGE.

October 30th.

POULTRY.—Mr. J. Rowan of Monteith, delivered an address on "Poultry Raising." He said "A mistake made by many beginners in the poultry industry is to rush into the business on too large a scale, and without any experience in nine cases out of 10. The best plan is to start in a small way, and to proceed step by step, making the birds pay their upkeep first in a small way, and gradually extending to a larger scale. The first consideration of the poultry keeper should be the proper housing of the birds. One of the easiest ways in which to begin is to purchase a pen of fowls just before the pullets begin to lay. The investment becomes at once an interesting hobby, as the purchaser secures an early return for his outlay in the shape of eggs. But whether a start is made in this way or by hatching or rearing a brood of chickens, care should be taken to have the house ready by the time it is required. Many disastrous beginnings have been made through neglect of this primary precaution, and what is true of beginning applies equally to the extension of the business. There are thousands of chickens lost every year through overcrowding the small coops in which they have been reared. This was, I might say, my own experience the first season. I could hatch them and brood them all right, but after I took them from the brooder then the trouble commenced. It is not the number of chickens hatched that counts, but the number raised. That is not the only drawback you get. I find that if you do not know what to do in any circumstances, the best thing to do is to call on or write to the Government Poultry Expert (Mr. D. F. Laurie), who will give you all the information you require, and assist you as much as possible. I have always found Mr. Laurie most obliging, and he will assist you in the same manner. Does Egg Production Pay?—The question which is still exercising the minds of some poultry men is does egg production pay at the present prices? I affirm without any hesitation that it does. It is a very poor type of fowl that will not lay from 180 to 190 eggs in a year. The time is coming when we shall get from 200 to 220 eggs in a year by single testing the birds and judiciously culling them out. The cost of a fowl's food

should not exceed 5s. 6d. at the present price of feed. At the last Parafield egg-laying competition—1914-1915—the average number of eggs laid per bird was 196, average cost of food per bird was 7s. 6d., and the profit over cost of food per hen was 8s. 11d. The lowest price for eggs was 7d., and the highest 1s. 8d. The cost of foods used was from 3s. 6d. to 8s. per bushel, as follows:—Pollard, 11½d. to 2s. 5d.; bran, from 11½d. to 2s. 5d. The highest price for eggs this year was at the end of May, when 1s. 7d. was the price, so that the present price of 7½d. is not too bad, as we can buy bran at 1s. 1½d. and pollard at 1s. 2d., while wheat is from 4s. 6d. to 5s. 6d. per bushel. This should prove to you that eggs will pay. The greatest want at the present time for the poultry man is the lack of co-operation. The small farmer can only look at co-operation to make his business what it ought to be. The co-operative system will protect both the producer and the consumer. Poultry men do not want big prices for their eggs, as if they get 1s. all the year round they will be satisfied. It is my opinion that to date Australia has not produced the number of eggs she ought. We should not become discouraged with the bogey of over-production, as there is little doubt that the next few years will see the export of eggs on a large scale from this State. Export is a live question, and though it is difficult to always dispose of eggs in this State owing to the comparatively small population, the future outlook is bright so far as export is concerned. Once the export trade is developed there will be no more gluts in the market, as all the large consuming countries of Europe will be short of eggs, and we shall be sure of getting good prices. Our climatic conditions are unequalled for the poultry industry, and we have the best egg-producing birds in the world, so that we have no fear of competition. Mr. Hilton said that he held the opinion that it would pay best where a man could raise his own food for the birds. He desired to know if it was profitable to raise table birds in the district. Mr. Rowan said that at present prices and cost of freight to Adelaide he did not think that it would pay to raise table poultry in this district. South Australia was the only State in which the poultry was not sold by weight. The poultry was just sold per bird, whether they were Leghorns, Orpingtons, or other birds. In his opinion the best cross was the Malay-Dorking for poultry purposes. Replying to another question, Mr. Rowan said that the cause of so many chicks dying was keeping them too long in the artificially-heated brooder. He thought it wise not to continue the artificial heat after three weeks. Mr. Filsell said that his experience with the heated brooder had been disastrous. This season, however, he had used only a cold brooder, and he had not lost a single chick. Mr. Rowan said that a man could well raise a few chickens on the cold brooder system, but a man could not raise a large number by that system, except with a lot more attention than the ordinary poultry breeder could devote to his business. In reply to another question, Mr. Rowan said that he found the best food for chickens was the good clean wheat cracked, and a few oats could be used with advantage. Charcoal could be fed to young chickens, and they would take it at a day old. Several speakers supported the cracked wheat idea. Mr. Lehmann said that poultry men could obtain good wheat from the farmers, and get it crushed at a small rate. Mr. Rowan advised the use of skinless oats for chickens, and Algerian oats for adult fowls. He also advised great caution with green bone, because if it was fed when the bone was old it gave trouble. Experienced poultry men preferred to give bonemeal, as it was preferable and more satisfactory than green bone. He advised that the rooster should not be allowed to run with the hens when eggs were wanted for market purposes. The birds laid better when the rooster was kept away, and the eggs kept better. It was the farmers who permitted the rooster to run with the hens who brought down the price of eggs, owing to the number of rotten ones that were found. He considered that September hatched chicks were the best for this district. For the ordinary back yard he considered that the Black Orpington was the best laying fowl for the Murray Bridge district.

PORT ELLIOT (Average annual rainfall, 20.33in.).

December 15th.

REPATRIATION.—Mr. W. E. Hargreaves contributed two papers, in the course of which he suggested the establishment of a fruit colony for the purpose of providing a means of livelihood for returned soldiers. The following extracts are taken from Mr. Hargreave's papers:—One of the chief difficulties that besets the

Government at the present time is the all-important subject of the repatriation of soldiers. I suggest that the Government would be doing a wise thing if they started a fruit colony in the hills, within, say, 10 to 15 miles from Port Elliot or Victor Harbor. There are hundreds of acres of cheap land in that vicinity which will produce fruit that is as good as any in the Commonwealth. If it will pay to grow and export fresh and dry fruit at Renmark, which is a comparatively long distance from seaports, why will it not be a paying concern to grow fruit here so close to seaports and railways? We enjoy a splendid rainfall, and would have no expense of irrigation. The timber alone which could be removed would go a long way towards the expense of clearing, and the city folk would no doubt not object to having more wood at a cheaper rate. Then there is the local demand. Thousands of posts could be made and sold, so it would not exactly be all going out and no coming in during the preliminary stage. Then there are other things to bring in a return, such as strawberries, English and Cape gooseberries, raspberries, potatoes, and green peas, all of which can be grown with advantage, and these things find a ready sale both in country and city alike. Fruit doing well in the black valleys do not necessarily do well in the hills; hence a man knowing the soil, climate, and characteristics of the place is needed as a manager. Most of the best export and early apples do well in our hills, also early peaches, apricots, prunes, plums (both Japanese and English), quinces, and pears can be grown advantageously. I have taken as much as five cases of plums from a tree 12 years old which I treated with various manures. I feel sure that many of our returned heroes who will not be able to do real hard work would be willing to do their bit in an orchard, where, with plenty of wood, water, fruit, vegetables, milk, eggs, &c.—all of which come off the place—they would surely never want for much. As a fruitgrower of 30 years' experience, I feel sure that the Government would be doing a wise and noble work if they undertook the repatriation of soldiers along similar lines to those mentioned. The land is cheap, climate good, rainfall very good, and the life is most healthy. Another profitable industry that this land can be used for is the growing of the *Pinus insignis* for furniture and box-making. The trees grow very rapidly in our hills. I have them 15 years old, and they are about 70ft. high, and from 3ft. 6in. to 4ft. 6in. in circumference. Planted at 12ft. apart means that there are 302 trees to the acre. After 20 years' growth they would be worth from 25s. to 30s. each, or, roughly speaking, from £377 to £453 per acre for the 20 years, or about £20 per acre per year. Then there are the herbs. The swamps and dark gullies will grow from a cabbage to a tobacco plant, and wattles do well on the poorest part of the land.

FRUIT COLONY.—Since writing the paper on "Repatriation" I have been requested by the members of this Branch to give estimates of the price per acre of clearing and planting the land that I recommended for the fruit colony; also how the returned boys are to live until the scheme is a paying concern. First of all let us consider the cost per acre, also the value of timber when cut into posts and firewood—Land, £4 10s. per acre; 130 fruit trees, £4 17s. 6d.; grubbing land, £5 12s.; ploughing, 12s.; harrowing, 6s. 6d.; clearing and burning rubbish, &c., £2; planting trees, £2 2s.; grand total, £20. Now let us look at the other side—300 posts at £2 10s. per 100, £7 10s.; stumps, £4; wood, £5 10s.; total, £17 per acre. You will now see that at least £17 will come in straight away for every £20 expense, and that is without taking into account the stones that could be quarried for the roads. I will now endeavor to demonstrate how the blockholders are to live until the scheme develops and becomes a paying concern. They could carry things on along similar lines to those already mentioned. Then they could grow small fruits, such as strawberries, raspberries, Cape and English gooseberries, &c., such vegetables as cabbages, cauliflowers, green peas, turnips, carrots, potatoes, &c. Then they could grow herbs, which will do well on this land, and the cultivation would help to bring the trees into bearing much more quickly. There is a ready market for any supply of these things besides keeping themselves well stocked in food. They could keep poultry. All these things will help to bring in money during the early stages, and all these commodities find a ready market. How many of the wives of our farmers often keep things going by these so-called sidelines? Let the Government give these blockers a certain wage for a time. It is the Government's duty to see them through. Finally I should have it understood that this does not apply to those who can do hard work, but more to those who need

light work. I will admit that some of it is hard, but the greater part would be just ideal for those who were not able to do hard work after their many trials.

CHERRY GARDENS, December 18th.—The meeting discussed at length the question of "Noxious Weeds."

KANMANTOO, December 22nd.—The meeting took the form of a discussion on several topics of local interest.

SOUTH-EAST DISTRICT.

KYBYBOLITE (Average annual rainfall, 22in.).

November 22nd.—Present: 13 members and two visitors.

FARMING IN KYBYBOLITE DISTRICT.—Mr. S. Shepherd, in dealing with this subject, said the successful occupation of land in that district depended chiefly on the following three points:—(1) The amount of capital, (2) size of holding, and (3) the method of working same. He was of the opinion that if one desired to obtain the best and greatest returns from the land, side lines, such as sheep and cows, &c., should be undertaken in conjunction with wheat growing. To bring about larger production he suggested that 100 acres of land should be fallowed each year and sown in March with Algerian oats. Subterranean clover was another good fodder grass, and if half a pound or 1lb. of seed was sown with either the wheat or oat crop much of the land where other fodders would not grow would readily answer to that crop. Super. at the rate of 1½cwt. to the acre and 1½bush. of oats were about the right quantities to use. After the sheep had benefited from the feed during the winter the paddock could be closed, and one would be able to cut the crop for hay. By sowing oats one was able to practise later fallowing, the seed could be sown dry, no pickling was required, neither was there any fear of take-all or smut. Lastly, if one cared to thrash a few tons of oats a straw stack could be built for a shelter, and that would be of great service during dry seasons. The Chairman (Mr. L. S. Davie) agreed with the speaker, and thought that cows should claim more attention from the farmers of the district. Mr. E. Schinckel thought kale should be grown as a summer fodder and oats during winter, that would enable one to increase the stock-carrying capacity of the holding. Messrs. Hahn, Bradley, and Bartram also spoke in favor of keeping sheep, cows, &c., besides growing wheat.

MOUNT GAMBIER (Average annual rainfall, 32in.).

December 8.—Present: 20 members.

LAMBS.—The Hon. J. Botterill, in an address on this subject, said the first point to be considered was, "Which was the proper season of the year to mate the sheep?" In that district they kept crossbred sheep. Merinos were mated as early as November 20th, but with crossbreds they would have to be later, and that was the point on which he was doubtful. Another question was—"Which was the better lamb, an early or late one?" Some said that if they had too early a lamb they would want more feed, and that consequently they could not keep as many ewes to the acre as if they had a late lamb. There was some force in the argument. The point occurred to him—Which was the more profitable animal when they came to the weaning period? Would not the difference in the value of the two animals compensate for the extra feed of the early one? Then there came the question—Will the early lamb not hold its own better when its mother had no milk for it than the young lamb? He preferred the early lamb, especially if they got into a season that was warm, and the younger lambs would not have the same strength to fight the warm weather as the older ones. Some said it would be no use mating Lincolns before the 1st of January. His feeling was that they should commence to do so in the case of Lincolns, Shropshires, Dorset Horns, &c., about December 20th, unless they yarded them. If it could be done about December 1st they would have lambs about the 1st of May. There was then plenty of feed for the lambs, and a certain amount of warmth in the air.

and they would grow better. But the point was, could that be accomplished? Lambs born in June, July, and sometimes in August, were subject to very rough weather, and there was heavy mortality. Another point he had noticed was lambs that ran on the barest of pastures were healthier and better than those on good pastures. He had noticed it frequently. Was that because there was more nutriment in the short feed than in the long feed? If so it would seem bad policy to save a lot of feed for them. Mr. G. H. Kilsby agreed with Mr. Botterill on the main points. If they could get earlier lambs it would be better. There would be plenty of succulent feed about, and from the wool point of view it would be an advantage, and also if they were wanted as freezers. It was also more difficult to get late lambs through the summer than others. The rams and ewes should be yarded at least three times a week, he considered. It was a mistake to have the rams too fat. If they were to be successful sheep breeders it would be necessary for them to keep cattle to keep the rubbish down. Mr. J. H. Buck agreed that lambs preferred moderate pastures to luxuriant ones. There was something in the high grass that did not suit them. They required shorter and sweeter grass. Mr. Hart endorsed the statement that cattle should be put on the sheep land to eat the rough grass, or that it should be burned off occasionally. If necessary he advocated physicking the rams and yarding them with the ewes three or four times a week. He united them early in December. Mr. A. A. Kilsby was in favor of early lambs, and very often had them in May. A good plan was to yard the sheep together a week or so after taking the lambs away. He found the early lambs stronger and better than the late ones. There seemed to be more nourishment in bare pastures than in rich. In high grass there seemed to be a lot of stuff that stock did not care for. Neither cattle nor sheep did so well in high grass as short. Mr. J. Keegan thought the short feed was of a more succulent nature, but the long feed was of a woody and fibrous nature, and was, therefore, harder for the lamb to digest than the more succulent short feed. Mr. Sassanowsky understood the question to be—"Was it possible to make the sheep lamb earlier?" At present it could only be done with great difficulty. If the ram was bred earlier in the season would it have the effect? He thought that in some cases physicking was the best thing. In some instances, on farms, they had succeeded in getting early lambs, but conditions were different on large areas. The next question to answer was—"If one got the lambs earlier would they pay, in view of the extra feed they would require? He thought if they could get the lambs in May it would be best. They would mature earlier, and the owner would get a bigger fleece from them, and the fleece of the ewes would not decline much. In August and early in September there was a lack of feed. Everything was in favor of the early lamb. If they had a large amount of grass in May he thought it might be wise to graze it down as short as they could. They had this year to take sheep off splendid succulent burr land, where they were starving, and put them on poorer country, where they became rolling fat by shearing time, and strong wethers had to be put on the burr to eat it down.

MOUNT GAMBIER (Average annual rainfall, 32in.). January 1st.

SHEEP TICK.—In a discussion on this topic Mr. R. Fowler suggested that each brand of sheep dip placed on the market for sale should be analysed and the results published. The Hon. Secretary (Mr. D. A. Collins) was of the opinion that if one wished to obtain the best results poisonous dips should be used. Three weeks or a month after shearing was a good time to dip the sheep, as there was then sufficient wool on the animals to hold the dip. Mr. McCormack thought that if the sheep were not kept in good condition after dipping they were subject to attacks from tick. Messrs. Hogan, Sassanowsky, and Major also spoke.

MUNDALLA.

November 30th.—Present: 10 members.

PRUNING AND FRUIT-GROWING.—Intense cultivation and pruning were essential for the successful production of fruit, said Mr. D. A. Low, in a short paper under the heading of "Pruning and Fruit-growing." If soft water was available the orchard should be irrigated and cultivated about four times during the year; but if only well water was procurable he thought the irrigation should be

reduced and the cultivation increased. He preferred summer to winter pruning, and thought the soil could be improved with a dressing of manure. If the trees were sufficiently stocked with fruit spurs a late summer pruning, say early in February, would have a good effect on the next season's crop; but if the tree would stand more fruit spurs the inner branches could be shortened back about the middle of November. The centre of the trees should be kept well opened in order to allow the rays of the sun to penetrate inside. At the previous meeting of the Branch a paper on "Sheep Tick" was contributed by Mr. R. Wiess. The true sheep tick, he said, had eight legs; but the tick found in Australia, and commonly called the sheep tick, only had six legs. The sheep tick was the most widely known of all sheep pests, and one from which few flocks could boast complete immunity. It seemed to thrive much better on the English breeds and their various crosses, whose wool was not so dense as the Merino. It was always a noticeable fact that sheep in poor condition were more subject to the attacks of the ticks than those in good condition. The presence of tick in a flock was usually indicated by the sheep rubbing and biting themselves. The constant irritation set up by the tick could only result in loss of condition, both in regard to wool and mutton. The tick laid only from three to five eggs at intervals of a few days, exuding at the same time a sticky substance which caused the egg to cling to the wool. They could hardly be called eggs, because they contained a living pupa which had previously germinated in the tick's body. About three weeks after being deposited the young tick commenced its active life on the sheep, and in 12 days' time would be fully matured, and would lay its first eggs. The speaker, in view of the foregoing facts, urged upon members the need for regularly dipping sheep. Poisonous dips should be used. They remained sufficiently strong on the sheep to kill any young ticks that might hatch after the sheep had been dipped.

NARACOOORTE (Average annual rainfall, 22.60in.).

December 1st.—Present: 25 members.

PESTS ON THE FARM.—An interesting discussion on the subject "Pests on the Farm, and How to Deal with Them," was initiated by Mr. A. Johnstone, who mentioned that the shell back snail had been very prevalent during the season. That pest would prove very destructive in a crop of rape. As a means of destroying the small green caterpillar which attacked the hearts of cabbages, he suggested syringing with an emulsion of 1oz. arsenate of lead to a gallon of water. It was not necessary, he said, in reply to a question, to put treacle in a spray used on apple trees, excepting perhaps in a wet season. Mr. Loller referred to takeall and red rust. If farmers had smut in their crops it was their own fault. A solution of 1lb. of bluestone to 10galls. water was the best mixture to destroy the fungus. The Chairman (Mr. S. H. Schinckel) referred to the prevalence of the blowfly. It could be materially decreased if stockowners were to destroy all dead animals by burning. Mr. Rogers had found a trap for the flies effective.

TANTANOOLA.

December 8th.—Present: 24 members.

POULTRY.—Poultry should be raised in that district, said Mr. A. Carthew, in a paper, under the heading of "Poultry-raising," chiefly with a view to egg production. The distance from the city markets was a great drawback to the rearing of birds suitable for the table. Cleanliness was an important factor in housing of the birds. The sheds should be thoroughly cleaned out once a week and white-washed every spring. A little carbolic acid mixed in the wash would kill all lice, and act as a disinfectant. In order to avoid the trouble of the birds fighting for the highest perches it was a good plan to make them all the same height, say, about 3ft. from the ground. It was important to see that the drinking vessels and water were kept very clean. A scratching pen should also be provided to give the fowls exercise in obtaining food. Lucerne or some other greenfeed, shell grit, and a mash with an addition of bone meal made a good strengthening food. Leghorns had proved to be the best breed for laying purposes, while Orpingtons, Rhode Island Reds, Plymouth Rocks, and Wyandottes had also given good results. He did not advise keeping the hens after the third laying season, with the exception of the very best birds that might be kept for breeding purposes. The beginning of August to the middle of September was about the best time

to set the hens if one wished to have eggs through the winter months. No bird that showed signs of broodiness should be used as a breeder. Medium sized and clean shelled eggs should be selected, and the nest made on the ground in a quiet secluded spot. If a box was used a sod of earth should be put in the bottom before making the nest. The cockerels should be separated from the pullets as soon as one was able to distinguish the sexes.

SANDALWOOD, January 5th.—The meeting took the form of a "Question Box." Various topics were discussed.

SANDALWOOD, January 26th.—Mr. J. Collins gave the results of the experimental plots conducted by him. A discussion followed on "Noxious Weeds."

STOPPAGE.

At this time of the year numerous urgent calls come in as cases of stoppage, generally supposed to be stoppage of the water. Certain points have to be borne in mind, first, that change in food is a fruitful source of acute indigestion in the horse. Horses are now coming on to new hay. This, says the Veterinary Lecturer (Mr. F. E. Place, B.V.Sc., M.R.C.V.S.), is the commonest cause of the trouble. Secondly, exhausting work is the cause of many cases; harvesting in extremely hot weather may fairly be considered such. Thirdly, unduly long intervals between feeds, with or without the two previous ones, brings on the trouble. Fourthly, irregularity in watering, generally too little, or injudiciously given.

As to prevention, the following are suggested:—(1) Bring the horse on to changed feed gradually; (2) have a spare horse in the team; (3) use the nosebag, or better, the ground sheet, several times a day, while the machine or the load require adjusting. A horse enjoys his "smoke ho" just as much as you do; this is a bit of chaff on his behalf. (4) The almost impossible little and often is what the working horse wants before he eats. A few handfuls of oatmeal in trough if he is unable to drink till after work will prevent a good deal of what the Yorkshireman calls "bally wark." Big drinks on a full stomach will bring on stoppage; no drinks on an empty one will do worse. Steer a middle course.

The man who is always having stoppage cases among his horses should buy a tractor instead; he is wanting in horse sense. But an odd case will crop up every now and again in the best of regulated stables, and in 99 out of every 100 cases the trouble will be in the bowels. The stoppage of the water theory should be a thing of the past in South Australia, but it never will be. The line of thought is like this:—No water passed, pain, dose to cause passage of water, passage, no pain. Q.E.F., as Euclid said. What really happens is:—Pain in the belly; position for passing water increases it; therefore water held in bladder. Dose soothes and stimulates weary painful bowels; pain disappears; water is passed. Therefore medicines required are stimulants and laxatives with a certain amount of soothers. Gin $\frac{1}{2}$ pt., ess. peppermint a teaspoon, warm water $\frac{1}{2}$ pt., raw linseed oil 1pt., painters' turpentine 2 tablespoons, coffee 1pt., baking-soda 1 tablespoon. Fuller and further information in bulletins "The Medicine Shelf," and "The Horse."

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Monthly Notes in *The Journal of Agriculture*; subscription 1s. per annum, posted; 2s. 6d. Inter-State.

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CROWN LANDS.

LANDS TO BE OFFERED.

At an early date lands in the Western, South-Eastern, and Central districts will be available for application under conditions of Agreement with Covenant to Purchase, Perpetual and Miscellaneous Lease.

Full particulars will be published in the *Government Gazette*, when detail and plans will be available on application to the Secretary for Lands, Adelaide.

APPLICATIONS FOR LAND.

Intending applicants for any lands which are open are reminded that application may be made for the whole or any portion of a block. The Land Board has power to allot portion of a block, if considered advisable, and to adjust the purchase-money or rent. If only portion of a block is applied for, deposit of a proportionate amount must be made, and the successful applicant would be required to pay cost of survey.

ALLOTMENTS, SALES, TRANSFERS, SUBLEASES, AND MORTGAGES.

Notice is hereby given that in future no applications for land, or for transfer, sublease, or mortgage of Crown leases or agreements will be approved to unnaturalised persons of any nationality, or to naturalised persons of enemy origin unless the consent of the Honorable the Attorney-General of the Commonwealth be first obtained by the parties making the application.

Where any doubt as to nationality exists, it will be necessary for certificate of birth or naturalisation papers to be exhibited.

The same principle will apply to land sold by auction.

OFFICIAL LIST OF LANDS OPEN.

The attention of intending applicants for land is directed to the Official List of Lands Open, which may be seen at the principal Post Offices, and copies obtained at the Office of the Secretary for Lands. The List shows the Areas, Localities, Prices, &c., of the Sections available and the conditions under which they may be applied for.

NOTICE TO APPLICANTS FOR LAND.

The Land Board meets daily (when necessary) at the Board's Office, Department of Lands, to deal with applications received the previous day for any lands that may be open in the Official List. Applicants must either attend personally or send a full written statement. Forms can be obtained at Post Offices, or on application to the Secretary for Lands.

HARRY JACKSON,

Commissioner of Crown Lands and Immigration.

AGRICULTURAL COLLEGE, ROSEWORTH.

The seed grains submitted for sale this season comprise a number of early, mid-season, and late wheats and barleys, a mid-season variety of oats, and a small quantity of field pease. The cereals have all been selected from pure strains and well graded. The production of selected and graded seed has been continued at the College for over 12 years, and hence most of the strains now being offered possess unbroken pedigrees of considerable length.

**CATALOGUE AND PRICE LIST OF SEED GRAINS
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Orders will now be booked for any of the undermentioned varieties, and applications will be dealt with as far as possible in the order in which they are received. The prices quoted are "on truck, Roseworthy," and are subject to revision. All orders and inquiries should be addressed to—

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Agricultural College, Roseworthy.

GRADED PEDIGREED SEED WHEATS.**EARLY VARIETIES.**

King's White	Selection 9 ..	5/- per bushel
King's White	" 10 ..	5/6 " "
King's Red	" 10 ..	5/6 " "
Caliph	" 1 ..	5/- " "
Gluyas	" 9 ..	5/- " "
Gluyas	" 10 ..	5/6 " "
Late Gluyas	" 9 ..	5/- " "
College Eclipse	" 9 ..	5/- " "

MID-SEASON VARIETIES.

Daphne	Selection 4 ..	5/6 per bushel
Queen Fan	" 6 ..	5/- " "
Anvil	" 4 ..	5/6 " "

LATE VARIETIES.

Canaan	Selection 4 ..	5/6 per bushel
Marshall's No. 3 B	" 8 ..	5/6 " "
Yandilla King	" 4 ..	5/6 " "

GRADED AND PEDIGREED SEED BARLEYS.**EARLY VARIETIES.**

Tunis 1	Selection 1 ..	4/6 per bushel
Tunis 2	" 1 ..	4/6 " "
Tunis 3	" 1 ..	4/6 " "

MID-SEASON VARIETIES.

Tunis 4	Selection 1 ..	4/6 per bushel
Tunis 5	" 1 ..	4/6 " "
Roseworthy Oregon	" 9 ..	4/6 " "
Roseworthy Shorthead	" 10 ..	4/6 " "

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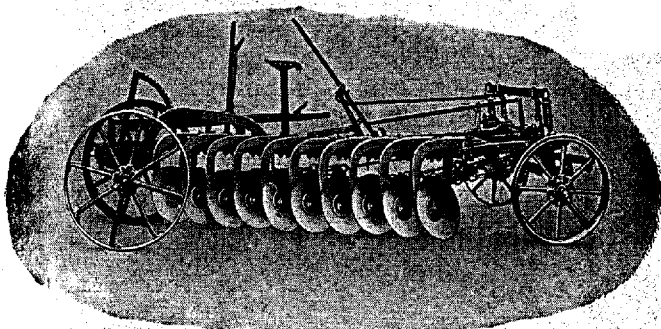
Pease—Early Dun	5/6 " "
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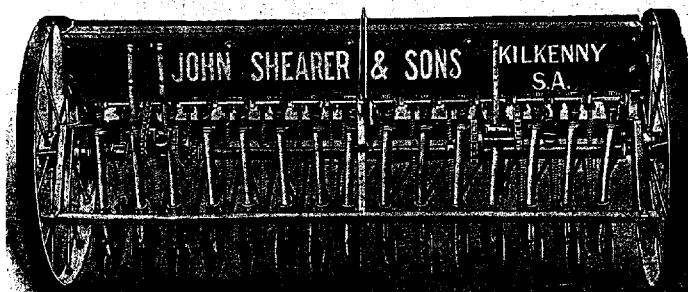
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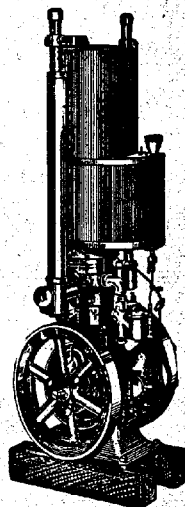
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The following publications have been issued by the Department, and are available for distribution at prices mentioned:—

"Fruit Tree and Grape Vine Pruning," by Geo. Quinn (Horticultural Instructor); price, 2s. 6d.; posted, 2s. 8d.

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Journal of the Department of Agriculture, 1s. per annum in advance; 3d. per single copy to residents of South Australia. Other places, 2s. 6d. per annum.

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